

Our Toxic World

A guide to hazardous substances
in our everyday lives

TOXICS LINK



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A guide to hazardous substances
in our everyday lives

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Toxics Link
www.toxicslink.org

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for a toxics-free world

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Contents

<i>Foreword by Ravi Agarwal</i>	vii
<i>Acknowledgments</i>	ix
<i>Introduction</i>	xi
<i>Cast of characters</i>	xiv
1. Construction: City of bones	1
2. Automobile pollution: Air today, gone tomorrow	17
3. Environmental legislation: Laws of the land	25
4. Industrial pollution: Poisonous development	39
5. Chemicals: Killer cocktail	55
6. Electronic waste: System failure imminent	75
7. Plastics: Material mayhem	89
8. Heavy metals: Trail of destruction	97
9. Food: Toxins at your table	109
10. Household waste: Attitudes that stink	119
11. Recycling: The right stuff	135
12. Festivals: Callous celebrations	145
<i>Glossary</i>	159
<i>Behind the book</i>	162

Foreword

Everything about the environment seems to be “bad” news. Is it time to switch channels? What is worse is that the issue seems so large, and beyond our grasp. For example, climate change is engulfing the globe and portends that doomsday is not far. Or everything we drink and eat is contaminated with heavy metals, pesticides, or introduced genes, so what *do* we eat? Mountains of waste will engulf our cities and our homes soon, breathing toxicity into all we inhabit. It seems it is time to close the newspaper and start living our lives, since there is little we can do to change the situation. Like helpless hares, we seem to be frozen in inaction, hypnotized by the snake, which is about to devour us.

Yet this need not be true. We can and do make a difference. Each and every action we take, does count. It is not only about how we consume, for example, saying “no” to the plastic bag, or changing the light bulb to a CFL, but also, how we help others to act. Asking the toy shop if it has lead in the toys our children will play with will trigger off action from the toy manufacturer, as will querying the waste management company about what it does with the waste after we segregate it at home. This power of influencing change has been demonstrated time and time again and it cannot be underestimated. In fact, it may be the only reason anything has changed in the past, through making choices in our everyday existence, both as consumers and citizens.

However, often we are not told about what is going on around us, not as doomsday messages, but as helpful information which can help us be aware, and act as rational intelligent beings. Information availability of this type, is very poor, even in this “information age”! The products we buy are not labeled to tell us what chemicals or heavy metals they contain, and what their potential health risk could be, for example. Our cars do not have carbon meters to help us make a choice about the next journey. Our drinking water does not announce how many pesticides it may contain, or our computer about the toxic waste it leads to. Our specific environmental concerns are often not translated into information, and hence we are left immobile about our choices and actions. This needs to change. Rational choices need the right information, but we need to demand it.

The reasons for the change are also about our own health and quality of life. Environmental impacts are very significant causes for poor health globally, especially in developing countries. Lead exposures from paint and toys lead to lower IQ and reduced intellectual potential. Mercury in water and fish leads to organ disorders and coordination difficulties. Burning PVC plastics can lead to hormonal problems and cancer. There are some very good reasons for action.

The good news is that there are alternatives available. A solar lantern can light up our home. Paint can be lead-free. Water can be cleaner. The air can be breathable. These alternatives are available, but we need to choose them. That time has come upon us—for the future of our planet, as well as ours and that of our children for whom we inherit this earth. We can do it, and being informed citizens is the key; being ignorant can only be termed foolhardy. Hopefully, this book will help us take another step towards being that.

Ravi Agarwal

Acknowledgments

The roots of this book lie in the huge volumes of information that Toxics Link, a Delhi-based environmental NGO, has put together on issues related to waste and hazardous substances in their 15 years of action on these matters. For that, we have to thank each and every member of Toxics Link, past and present. They—and others like them working tirelessly and often thanklessly on issues of global and local concern—have been instrumental in bringing in a consciousness toward a more responsibly nurtured environment. In doing so, they have created a suitable framework for the idea of this book to grow on.

In particular, the development of this book has been possible thanks to Alison Purdy who, as a volunteer placed by Challengers World Wide at Toxics Link, put together much of its text; Pragya Majumder, who patiently handheld, cajoled and coaxed, and sometimes impatiently threatened me into giving it shape; and the dynamic duo of Satish Sinha and Ravi Agarwal, who had the vision that made this project come into being. Of course, if Hivos, the Humanist Institute for Development Cooperation, hadn't been willing to fund the project, it would never have got off the ground.

Most words would be too few for my talented collaborator on the project, Priya Kuriyan, whose facility with the visual medium never ceases to fill me with wonder and awe. An animator with no experience on illustrating comics, she took the plunge bravely—and came out sparkling.

Salil Chaturvedi, my friend and professional partner for many years at Splash! Communications and, before that, Media Workshop, was tireless as always in his management of the project, dealing on my behalf with the big, bad world out there.

We were helped along the way with advice, feedback, and support from several people. Orijit Sen, doyen among comic artists in India, whom I am fortunate enough to have as my brother, gave us direction freely and without hesitation. I also got valuable inputs from Ravi Mani, P. Madhavan, Rajiv and Tallulah D'Silva, and members of the Goawriters group. Sorry guys, if some of the things you said didn't get incorporated—if this goes into a second edition, perhaps then....

Our Toxic World isn't exactly a conventional academic work, but Ashok Chandran, Rekha Natarajan, and the people at Sage Publications were willing to take a chance on an offbeat format, and so this will see the light of day.

Beyond that, it's all up to you, the reader, who've picked up this book hopefully with the idea of bettering your life and bettering the world in the process. Let's hope that together we get to make some difference.

Aniruddha Sen Gupta

Introduction

An allergy story: A friend of mine, Salil Chaturvedi, used to have these strong dark circles around his eyes that often developed an odd, parched texture. He didn't think much about them, even though some of us would comment on them whenever they got particularly bad. After more than two years of this on-and-off occurrence, he had gone to an Ayurvedic doctor on an unrelated complaint. The doctor took a look at the condition of his eyes and told him it was an allergy to, of all things, tomato ketchup! To test the validity of this diagnosis, Salil stopped having ketchup for a while and the dark circles indeed did disappear. Later, when he tried ketchup again, he found that the problem re-occurred. Experimentation told him it wasn't the tomatoes, but the chemicals that are used to preserve the ketchup that was causing the allergy.

The vanishing vultures: A study done in India in 2007 revealed that the vulture species in the country is disappearing "faster than the dodo" and the bird could be extinct in the next 10 years. Earlier scientific research had shown that one of the main causes of this disappearance was kidney failure among vultures, caused by a veterinary drug called Diclofenac. This anti-inflammatory drug is given to cattle to reduce joint pains and keep them working longer. It accumulated inside the bodies of the cows and buffaloes and was transferred to the vultures when they fed on the corpses of the animals.

The questions we ask: Some days ago, I was talking to a friend from Delhi about the problems with waste management in Goa, where I live. During the course of the conversation, it became clear that she had no clue about what happened to the waste that she generated once the *koodawalla* took it away, back home in Delhi. When I remarked on this, she said, "Who does?"

These stories point to a disturbing pattern in our contemporary lives. Our day-to-day existence has become so complex and intricately interwoven with chemicals and pollutants that we are rarely aware of our impact on the environment and the environment's impact on us.

How did it come to this? How have we allowed ourselves to be so overtaken by a way of life that we no longer have any control over? Even among those who notice these trends and ponder on them, very few realize that it didn't happen by chance.

The end of World War II signaled the end of the old order, one under which Western Europe had dictated the ways of the world for centuries. With the United States of America now gaining the mantle of leadership of the new world order, it was for the policy-makers of that nation to plot the future course of the global community. The direction that they determined was one best exemplified by this statement from Victor Lebeau, a top analyst of that era:

Our enormously productive economy demands that we make consumption our way of life, that we convert the buying and use of goods into rituals, that we seek our spiritual satisfaction, our ego satisfaction, in consumption ... we need things consumed, burned up, replaced and discarded at an ever accelerating rate.

This attitude has assiduously been promoted as the mindset to aspire for, and it has been a job well done. The vast majority of the world's nations has by now adopted one or the other variant of this philosophy of progress, and most people today view this model of development as the only viable one. As a result of this approach, we are now, so far, down this path to the future that the possibility of alternative routes is equated to a return to a primitive existence, and thus easily discarded.

However, in recent years, there has been a growing awareness that the chosen path is not without its pitfalls. For you to have picked up this book, these questions must be in your mind as well: Are the products that you use everything they are touted to be? Is there, perhaps, more to them than meets the eye—hidden aspects that can cause you or the environment harm?

To keep the concourse of consumption clear and unrestrained, the detritus that results from it has been consistently removed from the public gaze, in a manner that only postpones—and makes cumulative—its impact. This way of life is built on the foundation of a belief that resources are infinite, and that utilizing them without any form of reparation or compensation will therefore not hurt us, the consumers.

Unfortunately, this belief is erroneous. The extent of resources is certainly humongous, but it is not infinite, and human appetite and human growth have proven to be more voracious than even this vast abundance is able to sustain. As the number of human beings on the planet has increased exponentially over the last century, especially, the burden on the earth has proven to be too much for it to bear.

This had started becoming evident in the second half of the last century. The revelatory *Silent Spring* by Rachel Carson was one of the first pieces of work to bring attention to how man's technological advances were playing havoc with the systems of nature. Since the 1960s, when the book was published, there has emerged a steady stream of rigorously-researched and deeply insightful treatises which have spotlighted the seamier side of the development model that the world has adopted. But it is now, at the beginning of the 21st century, that we have begun to feel the full force of the ecological disaster.

The biggest crisis of the times is climate change wrought by global warming, but it is a sum of many different environmental problems that have become increasingly visible, especially in India. Our rivers and water bodies, even the very air we breathe, are choked with pollutants. Mining and industries, operating in untrammelled anarchy, are creating deep and suppurating wounds on the face of the earth. The cities are coating the ground with concrete, squeezing out the life breath of plants and wildlife that once shared that space. The waste that we create is spilling out of landfills and dumps where we tried to hide it, and into our lives. Everywhere, we are surrounded by chemicals, so much so that we fail to notice their presence and believe that this is how it has always been.

The deepest cut of all is that we have accepted that there is no way out. And this despite the fact that, at the level of the individual, the community, even the nation itself, examples and alternatives are available that show us that it is possible to travel a different path without having to go back in time.

This book attempts to explore some of these alternative routes. By taking a series of peeks at the lives of the fictitious Sachdeva family and the people they come in contact with, it examines the hazardous substances that affect us in our everyday lives, outlines the effects these materials can have on us, and suggests alternative routes that we can adopt for a cleaner, healthier lifestyle.

For this is the one certain lesson that we need to take away from the experiences of those, like Madhavi Kulkarni in this book, who have been fighting on the side of the environment—that it is individual actions that will collectively bring about the change that we desire. This book therefore focuses on individual stories to look at how we can each be the agents of that change in our own lives.

Aniruddha Sen Gupta

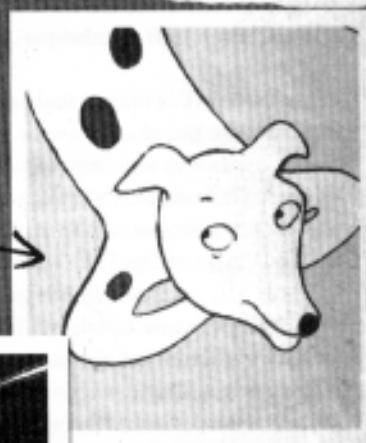


ALTAF MOHAMMAD
Farmer in UP.
Uncle of Imtiaz



SHANKAR
Street child.
A subject of
Madhav's
concern

BOZO
The Sachdeva's
pet dog. A mutt



BINDU MALHAR
Maid at the Sachdeva
household



IMTIAZ SHEIKH
Auto driver in the
city. Drives
Mohanlal Sachdeva
places

Cast of characters



MADHAVI FULKARNI
Environmental activist.
Friend of Prasad Sachdeva

ANAMIKA SACHDEVA
High school student

RAJESHWARI SACHDEVA
Homemaker. Prasad and Anamika's mother



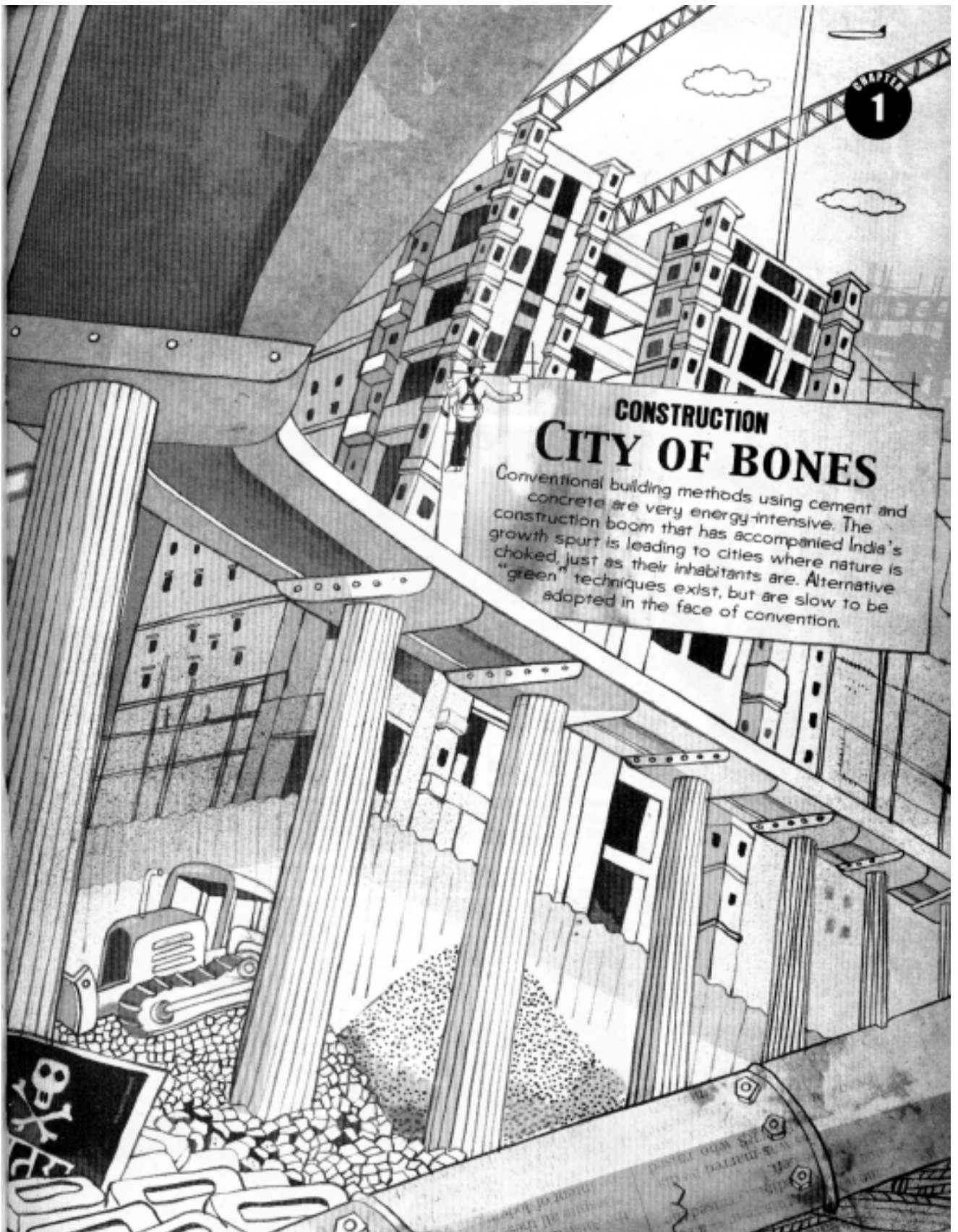
PRASAD SACHDEVA
Architectural apprentice.
Son of Rajeshwari and Mohanlal

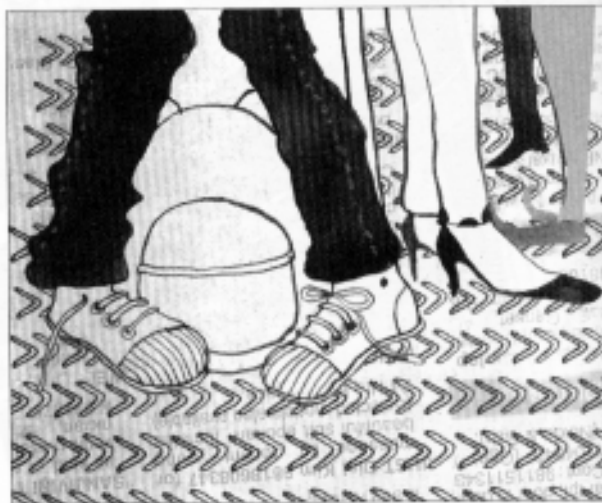
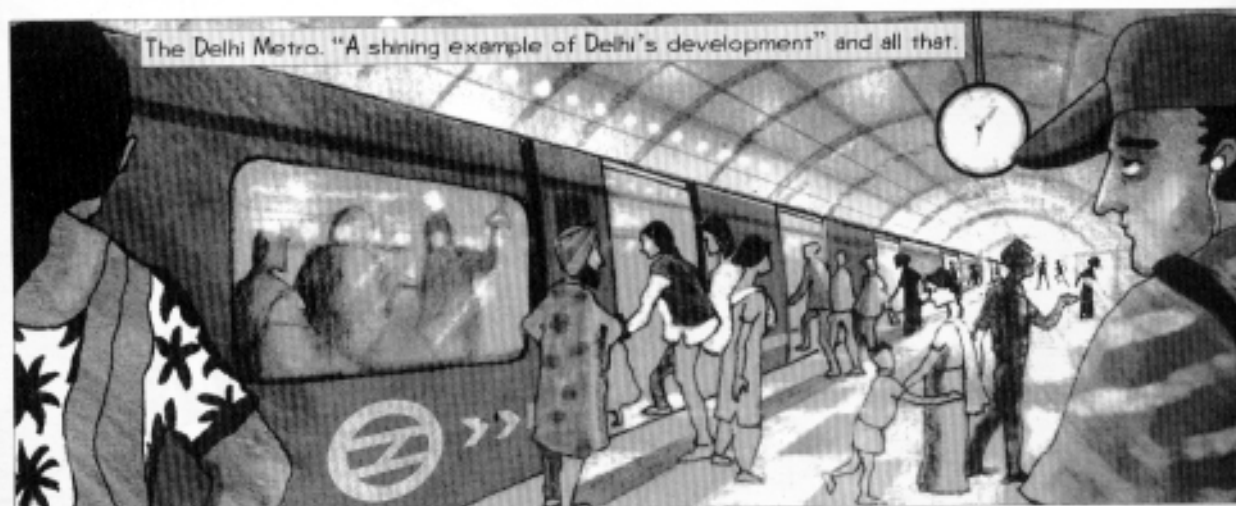
MOHANLAL SACHDEVA
Compliance inspector of
boilers and factories

...and a host of others

CONSTRUCTION CITY OF BONES

Conventional building methods using cement and concrete are very energy-intensive. The construction boom that has accompanied India's growth spurt is leading to cities where nature is choked, just as their inhabitants are. Alternative "green" techniques exist, but are slow to be adopted in the face of convention.

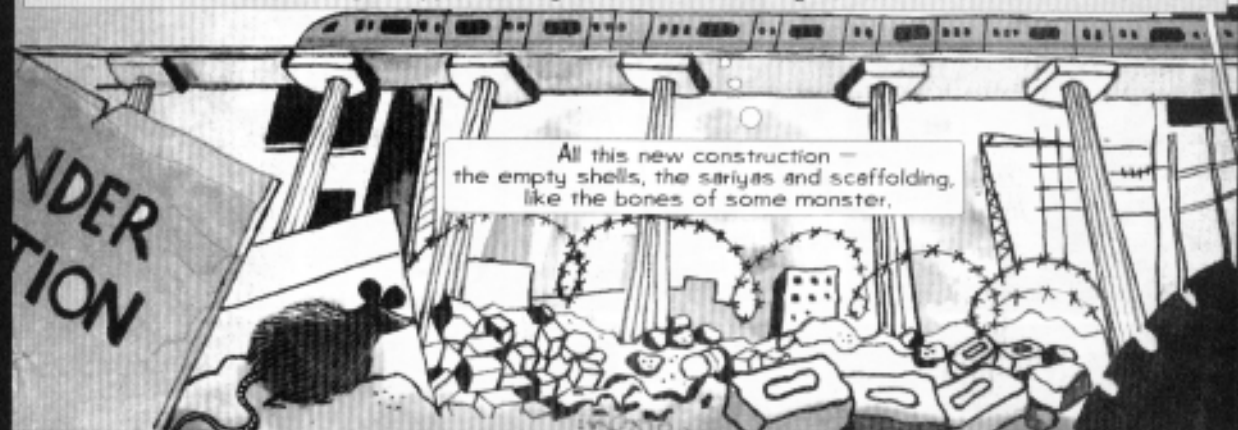




Prasad is a regular on the Metro. Every morning, he goes to work on it, and every evening he takes the train back home.



His education and training have changed the way Prasad sees the city. This, he imagines, is what it means to become an architect (okay, an apprentice right now, but eventually...)



ARRIVING ROHINI EAST



Delhi's becoming a city of skeletons.



Home is just a short rickshaw ride ahead but this is the part of the journey Prasad dreads.



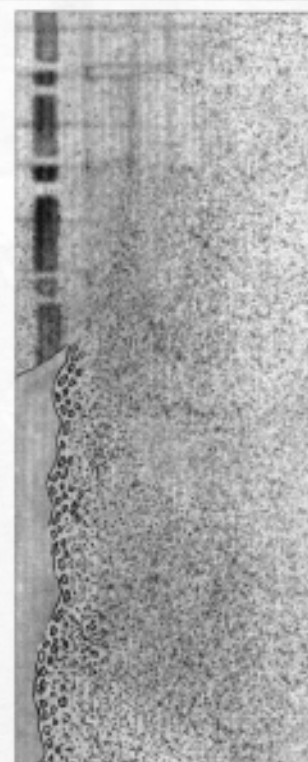
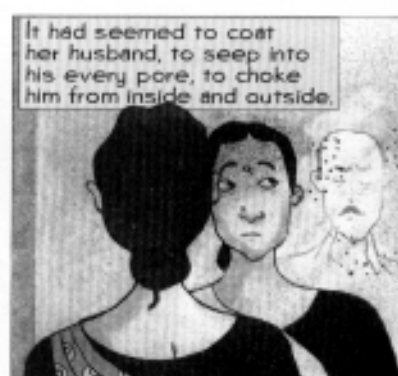
His asthma has been steadily getting worse.

Okay, here we go again.

So Prasad wends his breathless way home, as dusk falls over the city of bones.







When her children's breathing also began to be labored, Bindu had returned to Dr Singh.

They do have bronchial infections, but it's not much to worry about. I'll write out a prescription.

Dr Singh knows there is something to worry about. The city is booming, construction is rampant and the dust and toxins from the concrete-cement-and-glass structures are choking the population.

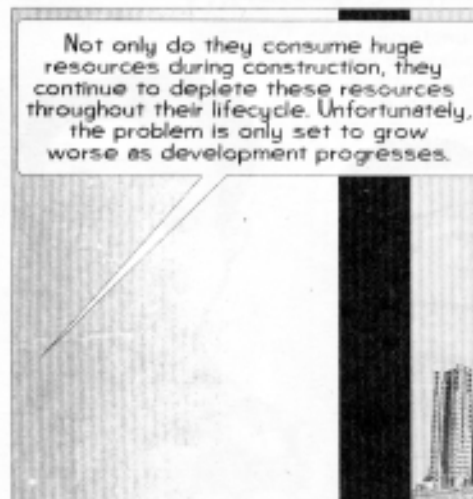
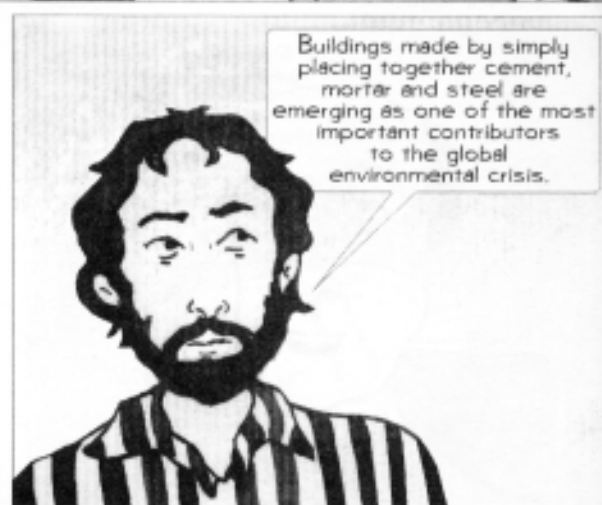
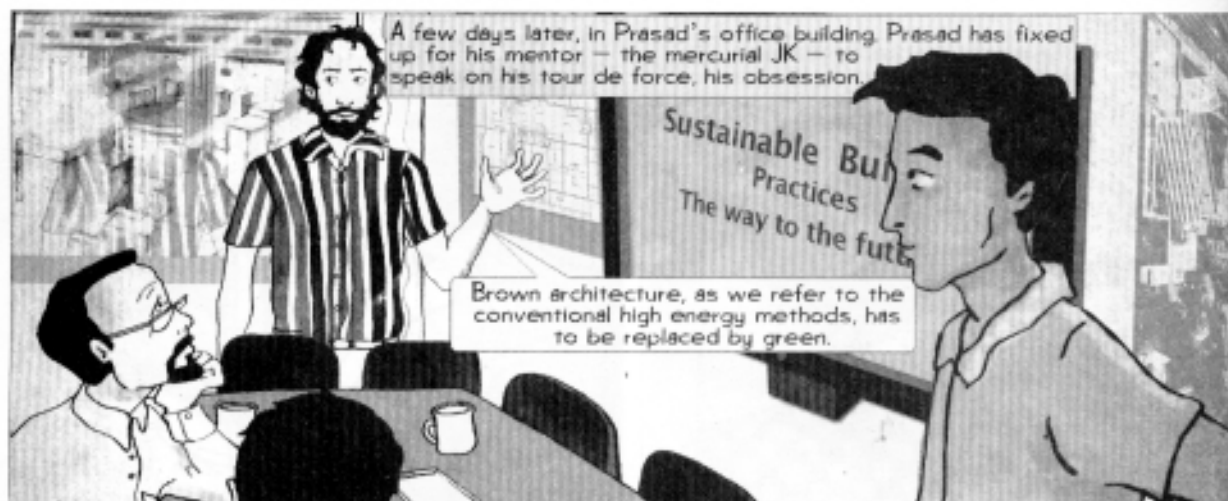
I should just photocopy this prescription. Every third child who comes to me has the same problem.

Besides its health impacts, conventional construction gobbles up natural resources, utilizes more energy than available and creates ecological imbalances that have long-term implications. In other words, it's completely unsustainable.

That evening...

That's prime property you've got your hands on, Doctor sahab. But for ideas for the building, you'd better ask Prasad when he comes.

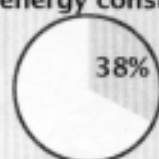




Energy and the environment

By the year 2050, Residential, commercial and institutional buildings are expected to consume as much as 38 percent of global energy production and to release about 3800 megatons of carbon in the atmosphere.

2050
global energy consumption



Residential, commercial and institutional buildings



3800 megatons of carbon



Materials used in building

Harvested:
Trees



Mined:

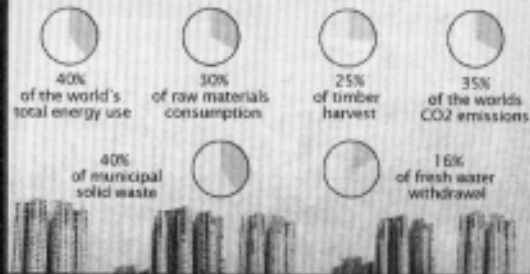


The environmental impact of a building begins right from when materials are sourced. How they are extracted and how much is taken can affect the environment, including the condition of the soil, streams and forests.

Processing, manufacturing and transporting these products cause additional environmental impacts, resulting from industrial pollution, the burning of fuel and the processes employed.

UNSUSTAINABLE DEVELOPMENT

Buildings consume or are responsible for :



Benefits of a green building

- 30-40 percent reduction in operating cost from day one
- 25-40 percent energy potentially saved
- Reduced water cost over the lifetime
- Improved health, safety and enhanced comforts of occupants
- improved performance and productivity of occupants
- Green corporate image

We need to look at green buildings, buildings that target conservation and low environmental cost as a basic feature of their design, and are constructed for efficient use of energy and water.

Can't these principles be applied to existing buildings to make them green?

That's Dr Singh's colleague, Dr Peter Monteiro.

To a certain extent. Applying suitable retrofit options to an existing building can substantially lower energy consumption and minimize its ecological cost. My presentation has some material on this subject.

For instance, if a building has conventional lighting, it could be replaced with a new lighting system that conserves energy. Or you could set up solar panels to take care of some of your energy needs.



* Natural light in home environment

* Energy efficient lighting improves productivity at work



* This resort uses solar power for its water heating

BARGAD VIHAR - an eco-friendly housing system

Rooftop rainwater collection system

Green areas and tree planting for natural cooling



This is a housing society where we set up systems for harvesting water, and landscaped the grounds to improve natural cooling. They tell us power and water bills have come down significantly since.



For existing structures, it's important to try and avoid new construction for remodelling, as that just leads to more resources being used up. Okay, to get back to my presentation.

LEED standards

. Adopted in 13 countries

. Focus on design and construction practices

. Cover parameters such as

- o energy efficiency
- o renewable energy
- o quality of indoor environment
- o conservation of materials and resources
- o safeguarding water
- o water efficiency
- o sustainable site planning
- o innovation and design processes

LEED ratings

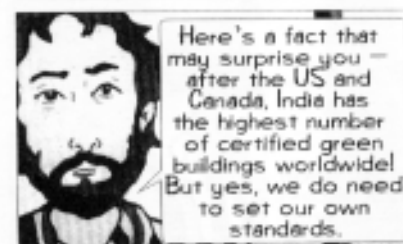
Given on a scale of 69

- . Certified 26-32
- . Silver 33-38
- . Gold 39-51
- . Platinum 52-69

Certification of green building materials and methods has been a critical need. The United States Green Building Council (USGBC), with its Leadership in Energy and Environmental Design (LEED) standard, is the main certification authority for green buildings.



What about India? Are we really ready for this?



Here's a fact that may surprise you - after the US and Canada, India has the highest number of certified green buildings worldwide! But yes, we do need to set our own standards.

IGBC Vision
To usher in a green building revolution in India, facilitating its emergence as one of the world leaders by 2010.

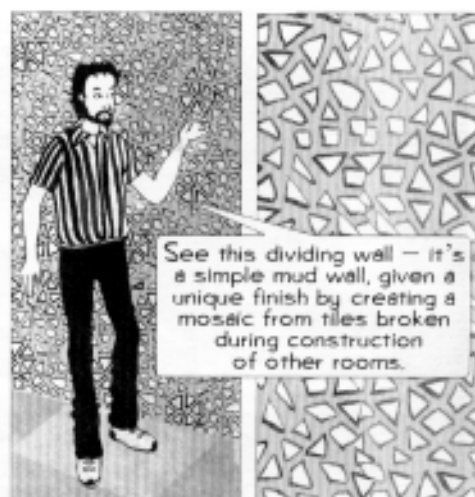
Action plan

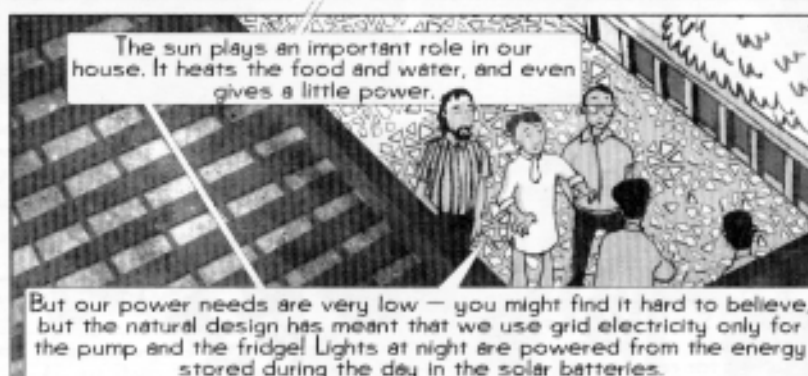
- . Create awareness on Green Building
- . Indigenize the LEED rating system
- . Develop local LEED accredited professionals
- . Facilitate construction of green Buildings in India.

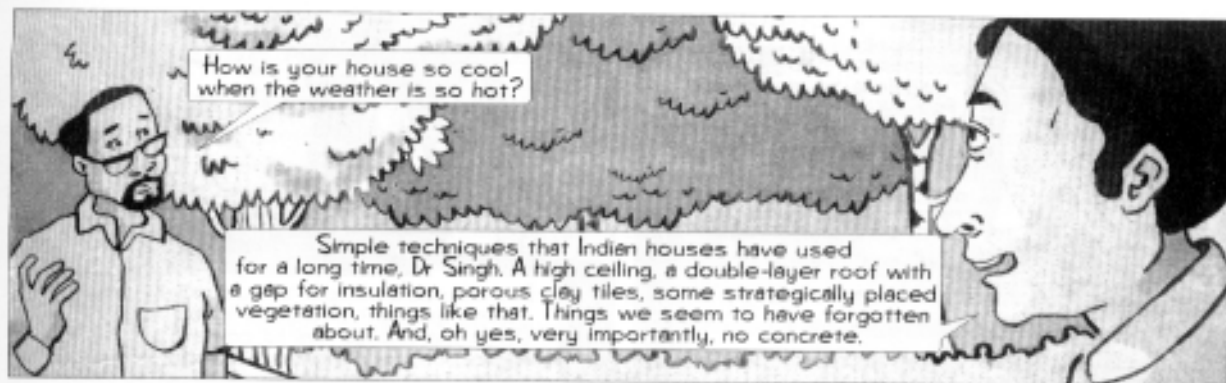
The Indian Green Building Council, set up to facilitate green building construction in India, has recommended that it be made mandatory for all buildings above 20,000 sq ft to incorporate green features.

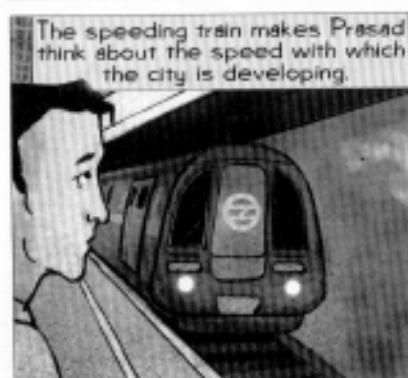
I could show you more on the computer, but I've always found that seeing it on the ground works better. Shall we?











Green versus conventional building techniques

Green Building > Conventional Building

1. Preserves and protects existing landscape features > Disturbs natural ecosystem by exploiting site resources
2. Employs erosion and sedimentation control techniques > Damages topsoil and landscape vegetation
3. Prevents storm water run-off > Impervious surfaces like hard paving with no storm water management
4. Location of buildings with easy public transportation access > Huge dependence on private vehicles
5. Uses low energy materials and regionally available materials > Uses energy intensive materials
6. Uses salvaged building products and renewable materials > Exploits energy by using non-renewable materials
7. Uses materials with high recycled content > Perpetuates solid waste problems by using materials with little or no recycled content
8. Safely disposes of construction waste and recycles debris to other sites > No management for construction waste, increasing landfill pressure
9. Low water consumption with water-efficient equipments and drought-resistant vegetation > High water consumption for landscaping and general use
10. Treated wastewater used for irrigation and flushing > No treatment facility for wastewater
11. Rooftop catchment areas harvest rainwater to be reused > No rainwater harvesting practised
12. Climate responsive design and energy-efficient heating, ventilation and air-conditioning equipment (HVAC) used > High-energy consumption in HVAC appliances
13. Uses CFC- and HCFC-free HVAC and refrigeration equipment > No efforts at minimizing ozone-depleting substances
14. Paints, adhesives and sealants used do not emit Volatile Organic Compounds (VOCs) > Endangers occupants' health and perpetuates pollution by using products which release VOCs
15. Renewable energy sources such as solar water heating, photovoltaic cells > No renewable energy sources used
16. High insulation, day lighting or natural cooling systems adopted, lowering power loads > Very high space conditioning and lighting loads
17. Reduced noise pollution, proper ventilation, daylight and views for all the occupied areas > Poor indoor environmental quality — no noise pollution control, artificial lighting used in the day due to poor ventilation



Promoting green building techniques in India

The Confederation of Indian Industry (CII) and the Godrej Green Building Centre (GBC) have formed a national level council called the Indian Green Building Council (IGBC). The IGBC has been involved in promoting the cause of green construction in India.

Leadership in Energy and Environmental Design (LEED) workshops have been held here, and IGBC delegations have attended these workshops in the US. The IGBC inked an agreement with the United States Green Building Council (USGBC) in 2005 for adapting the LEED rating system to suit Indian conditions and priorities.

This activity has its critics, however, who feel that the adoption of the LEED system in developing countries is just turning into another route for the West to dump unnecessary and expensive technologies. This viewpoint holds that India, and most cultures with a long history, have traditionally taken low-energy approaches to architecture and construction, using locally-available materials and resources. Many eco-conscious architects and builders are, as a result, taking recourse to various aspects of traditional methods of building as an already existing India-specific green building mechanism.

An Indian green standard

It's not that there hasn't been an attempt to develop a local standard. The Energy Research Institute (TERI) has developed a rating system called TERI-GRIHA (Green Rating for Integrated Habitat Assessment) specifically designed to address Indian buildings and environmental conditions. TERI-GRIHA evaluates the environmental performance over a build-

ing's entire lifecycle. A process of re-appraisal every three years takes into account the latest scientific developments. Various lifecycle stages of a building are identified for a consistent and long-term evaluation. These are the pre-construction stage, building design and construction stage, and building operation and maintenance stage.

The TERI rating, however, is also still to be tried and tested extensively under real-world conditions before it is adopted as a standard that architects and builders in India accept.

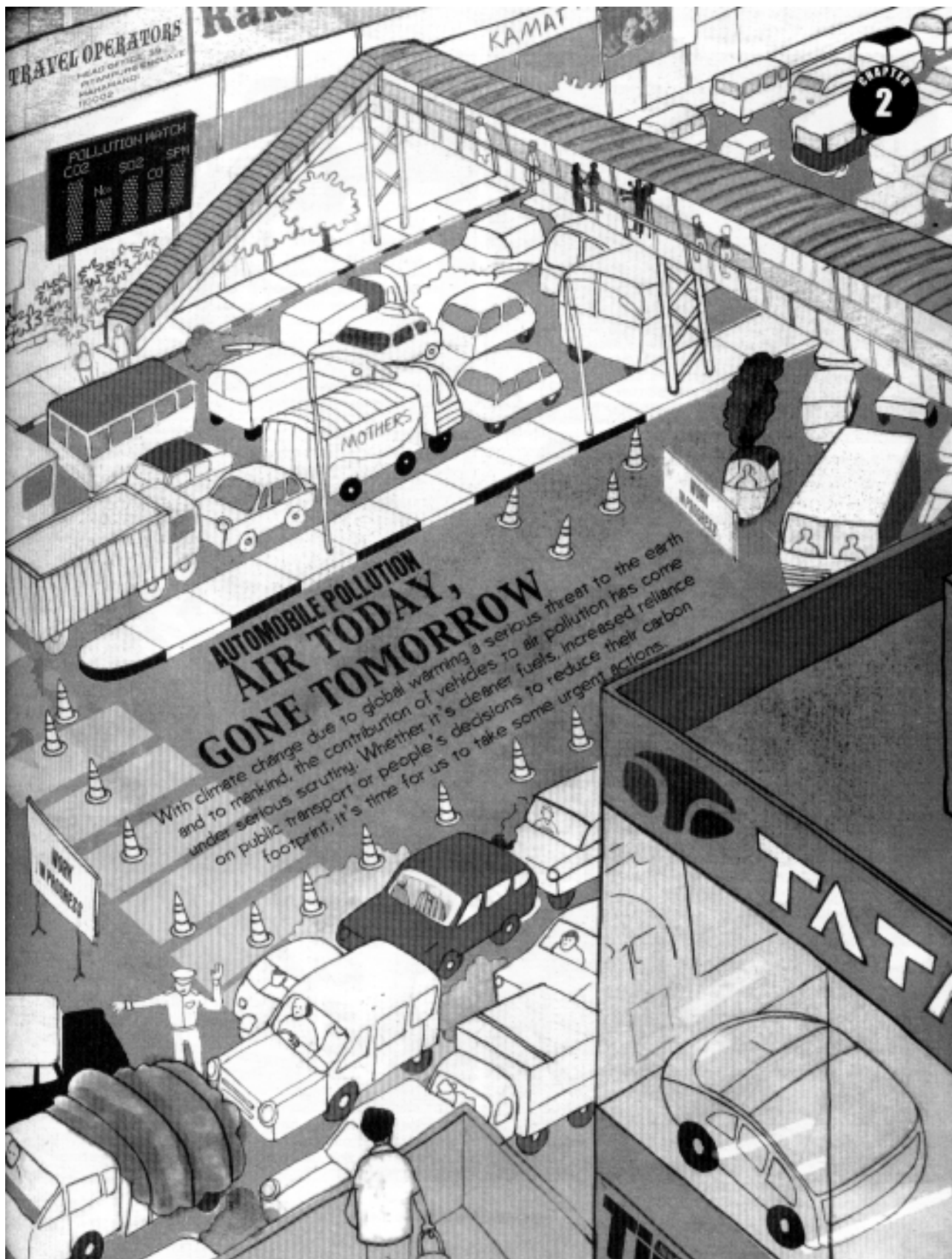
Building toward the future

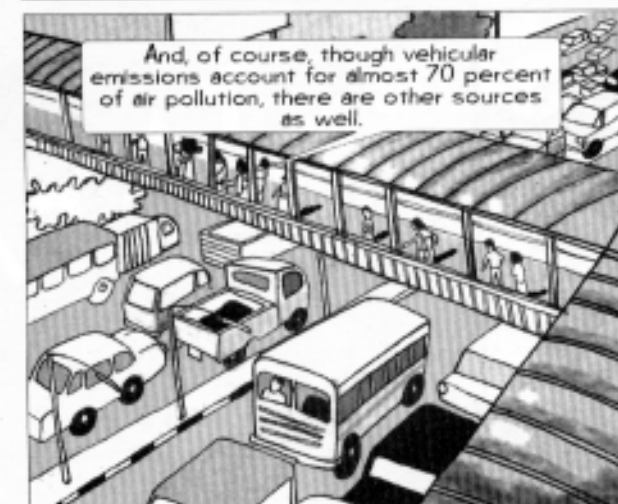
The construction industry is one of India's fastest growing sectors, contributing about 10 percent to the country's Gross Domestic Product. The industry is growing at a rate of 9.2 percent as against the world's average of 5.5 percent. The overall investment toward the urban building construction in India is estimated to be Rs 5,000 crore annually as per the National Institute of Construction Management and Research (NICMR). The estimated potential green building market in India by 2010 would be Rs 1,600 crore.

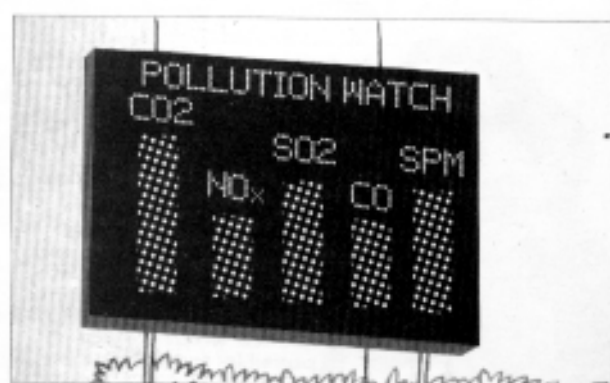
Comparing costs

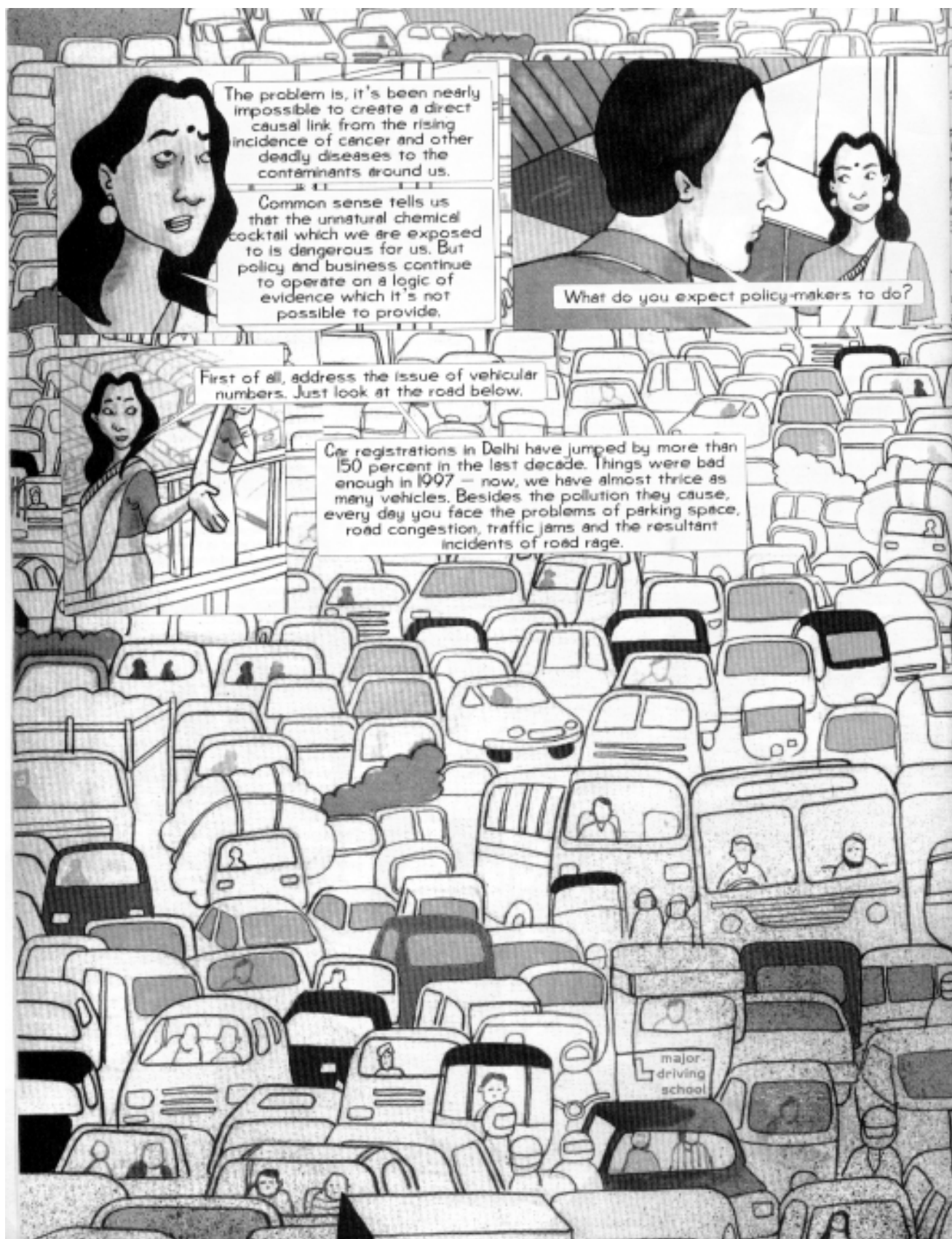
The cost of implementing a green design may be nominally higher than the conventional one, as the inputs do not have a huge demand base yet. But assessed over their entire lifespans, green buildings pay for themselves through reduced operation and maintenance cost. Green design saves overheads that one has to pay for in terms of lighting, heating/cooling and supply of portable water. Though a universal comparison is difficult at this stage, a rough assessment would put the cost of green buildings as only fractionally higher than that of conventional buildings, but the returns are great. Besides, the spiraling prices of cement and steel and the growing popularity of alternative building materials would make even this marginal difference meaningless in the coming years.











The problem is, it's been nearly impossible to create a direct causal link from the rising incidence of cancer and other deadly diseases to the contaminants around us.

Common sense tells us that the unnatural chemical cocktail which we are exposed to is dangerous for us. But policy and business continue to operate on a logic of evidence which it's not possible to provide.

What do you expect policy-makers to do?

First of all, address the issue of vehicular numbers. Just look at the road below.

Car registrations in Delhi have jumped by more than 150 percent in the last decade. Things were bad enough in 1997 — now, we have almost thrice as many vehicles. Besides the pollution they cause, every day you face the problems of parking space, road congestion, traffic jams and the resultant incidents of road rage.

major-driving school



And now you have that!

Can you imagine how the situation will be effected when that hits the road?

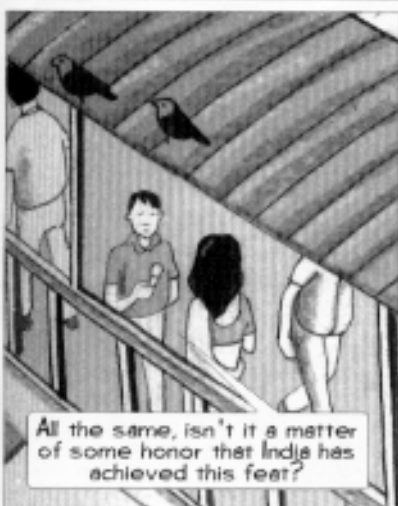


According to the Tatas, the numbers are only likely to replace two-wheelers, which are more polluting.



I never fail to be surprised at how easily you media people take big business at their word. Do you realistically believe that once the Nano hits the road, the numbers of two-wheelers are going to go down? That the Bajaj, TVS and Hero people are just going to sit by and let that happen?

Also, the Nano's 800cc engine is never going to produce less emissions than a motorcycle, most of which are 100cc or 150cc.



All the same, isn't it a matter of some honor that India has achieved this feat?



Given what we know today about fossil fuels and climate change, I don't know if there's much honor in India's making the same mistakes the West has committed over the past century.

Projects like the Nano show that we have the capability, the skills and the brains. These could help design the best public transport systems in the world. That would be something to be proud of.



But what about the aspirations of the aam aadmi, aspirations which the Nano can fulfill?



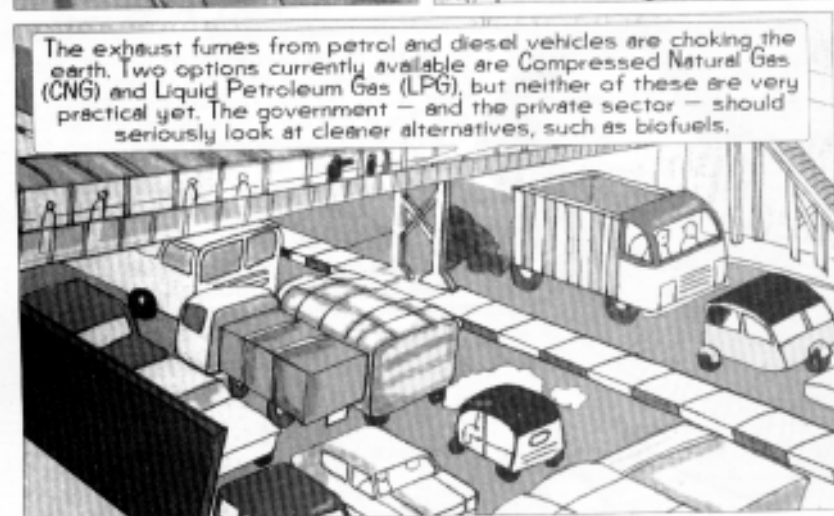
Who creates these aspirations in people? The businesses themselves, through their advertising and marketing. The same techniques can be used to create a different kind of aspiration among people.

After all, wouldn't you aspire to a future world where your children can breathe freely?



Bharat, however, doesn't seem to have the imagination to visualize such a future. He takes refuge instead in the world of facts.

You also mentioned cleaner fuels. What are the options for India?



The exhaust fumes from petrol and diesel vehicles are choking the earth. Two options currently available are Compressed Natural Gas (CNG) and Liquid Petroleum Gas (LPG), but neither of these are very practical yet. The government – and the private sector – should seriously look at cleaner alternatives, such as biofuels.



So the onus is on the government and on corporates?



Actually, the onus is on individuals. The only way we are going to have some far-reaching change is if each person becomes more conscious of the issue, and reduces the use of private vehicles as much as possible.



164min

With that, it's back to the studio. Thank you, Madhavi Kulkarni, for speaking to us. This is Bharat Thapliyal, for FlashTV.

0:08:49:08

FEB 10 2008

REC

Maintenance tips to help reduce auto pollution

1. Change engine oil at manufacturer-recommended intervals or if the vehicle has been lying unused for a long period.
2. While changing lubricant, make sure you use the recommended brand and more importantly, the grade of oil. Never use the wrong grade of oil.
3. If it is a carburetted vehicle, clean and tune the carburettor and adjust the idling speed every 3,000 km.
4. Check and adjust tappet clearance.
5. Inspect spark plug clearance, clean and adjust gap. Replace plugs if necessary.
6. Check the ignition timing and set as per the manufacturer recommendation.
7. Check tyre pressure regularly because low tyre pressure causes drag which increases fuel consumption.
8. If the vehicle has been parked unused for a long time, have the engine tuned and the engine oil replaced.

Some dos and don'ts

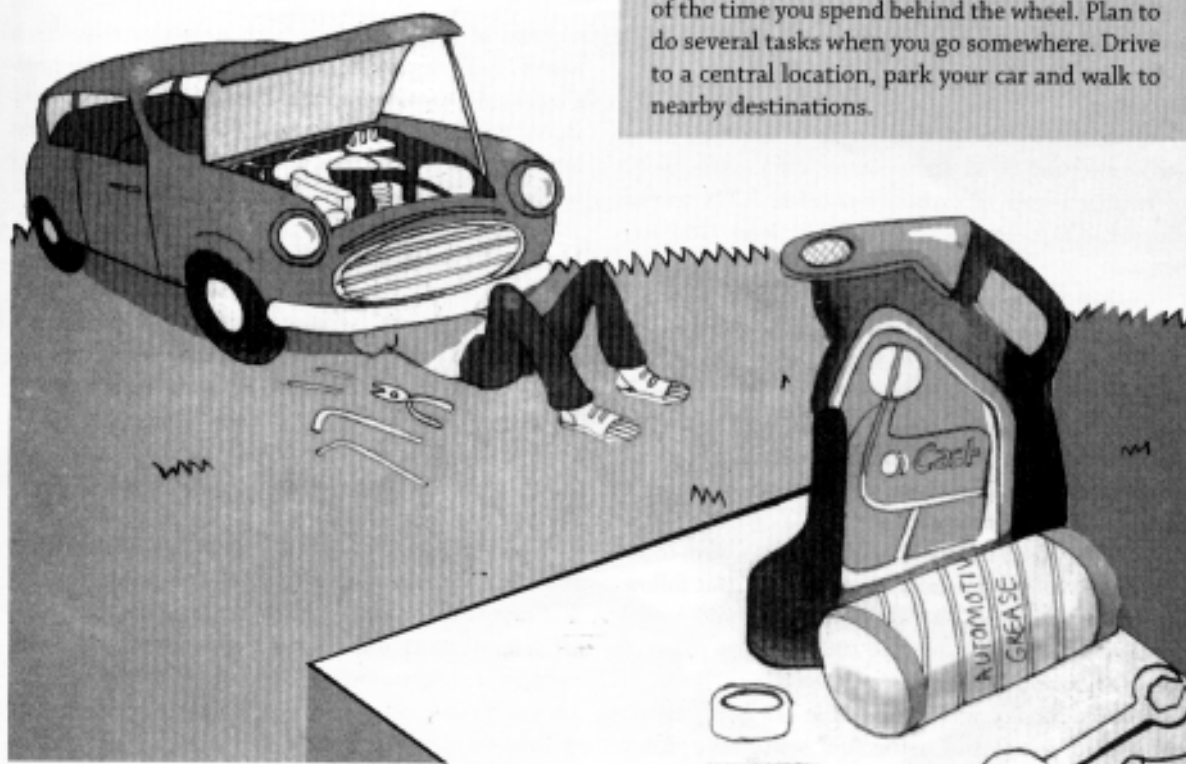
1. Avoid unnecessary revving or idling of the engine, it not only increases your fuel consumption but also increases pollution.
2. Switch off the engine at red lights, or where you are likely to stop for more than two minutes.
3. Try and drive around a speed of 50-60 kmph in top gear.
4. Speeding increases fuel consumption and this in turn increases pollution.

Avoid driving if you can

The most effective way to reduce emissions from your vehicle is to use it less.

Several options are available to help you reduce the amount you drive. These include using public transport, car pooling, consolidating trips and choosing clean transportation alternatives such as biking or walking.

By planning trips, you will get the most out of the time you spend behind the wheel. Plan to do several tasks when you go somewhere. Drive to a central location, park your car and walk to nearby destinations.



A comparison of different fuels

Diesel

Diesel is responsible for harmful emissions of SPM — tiny particles suspended in the air which are easily inhaled and which have the potential to cause cancer, pulmonary and cardiovascular diseases. The World Health Organization rates SPM to be the most serious air pollutant of all, resulting in the deaths of 460,000 people per year.

The thick black smoke associated with diesel-powered vehicles is caused by sulphur. A harmful diesel component is sulphur dioxide (SO_2), which can irritate the respiratory tract when inhaled. In high concentrations it can cause laryngo-tracheal and pulmonary oedema.

But more harmful still are the nitrogen oxides (NO_x) that are pumped out by diesel-powered vehicles. Nitrogen dioxide (NO_2) reduces the oxygen carrying capacity of the blood and causes lung tissue to become leathery and brittle. This can lead to lung cancer and emphysema. Nitrogen oxides react with hydrocarbons to create ozone, which can aggravate asthma and induce attacks in children, the elderly, and those suffering from respiratory diseases.

Petrol

If diesel is responsible for emitting sulphur, nitrogen oxides and SPM, then petrol is the main culprit in raising levels of carbon monoxide (CO), carbon dioxide (CO_2), hydrocarbons (HC), lead (Pb) and benzene.

Carbon monoxide can have a deadly effect on humans. It is quickly absorbed by the lungs and carried in the blood where it reacts with hemoglobin to form carboxy-hemoglobin. It hinders the transportation of oxygen around the body and so endangers the function of major organs like the heart and the central nervous system, which are dependent on large quantities of oxygen.

Lead has traditionally been added to petrol to aid ignition in internal combustion engines. But following the discovery of the environmental and health damage caused by lead in the 1980s, its use in petrol began to diminish.

Most countries, including India, are now phasing out leaded petrol and using fuel containing differ-

ent additives. However, those additives also harbor health threats of their own.

Benzene, a replacement for lead, can cause leukemia, lung and skin cancer if inhaled in high quantities, while acute poisoning can lead to death.

Compressed Natural Gas (CNG)

CNG is considered to be an environmentally "clean" alternative to petrol and diesel. It is made by compressing methane extracted from natural gas and is stored and distributed in hard containers built to withstand the intense pressure.

The high octane rating of natural gas allows CNG-powered vehicles to operate with a higher compression ratio than normal petrol ones. This improves the power output and reduces fuel consumption.

In addition, because natural gas is lighter than air and has very narrow flammability limits, if it leaks it is very likely that the fuel will disperse harmlessly into the air without danger of ignition or explosion.

However, CNG is not without its drawbacks. The storage of gas at such a high pressure requires a heavy, bulky cylinder that can withstand the pressure, significantly adding to the weight of the vehicle. Being gaseous, it doesn't make transportation over long distances easy or economical and so its use has to be restricted to short distances in urban areas.

Liquid Petroleum Gas (LPG)

LPG is one of the cleanest vehicle fuels available, producing far less carbon dioxide than petrol and fewer particulates and nitrogen oxides than diesel. Using LPG can cut carbon dioxide emissions by 20 percent compared to petrol. On urban roads, on average, just one diesel vehicle emits the same quantity of fine particles as 120 LPG vehicles and the same volume of nitrogen oxides as 20 of them.

In the event of a spillage, LPG evaporates rather than soaking into and polluting the ground. Not only is it more economical but LPG engines also run up to 50 percent more quietly than diesel engines. It has been in use commercially for over 60 years and has an impressive safety record. It now powers over 10 million vehicles worldwide.

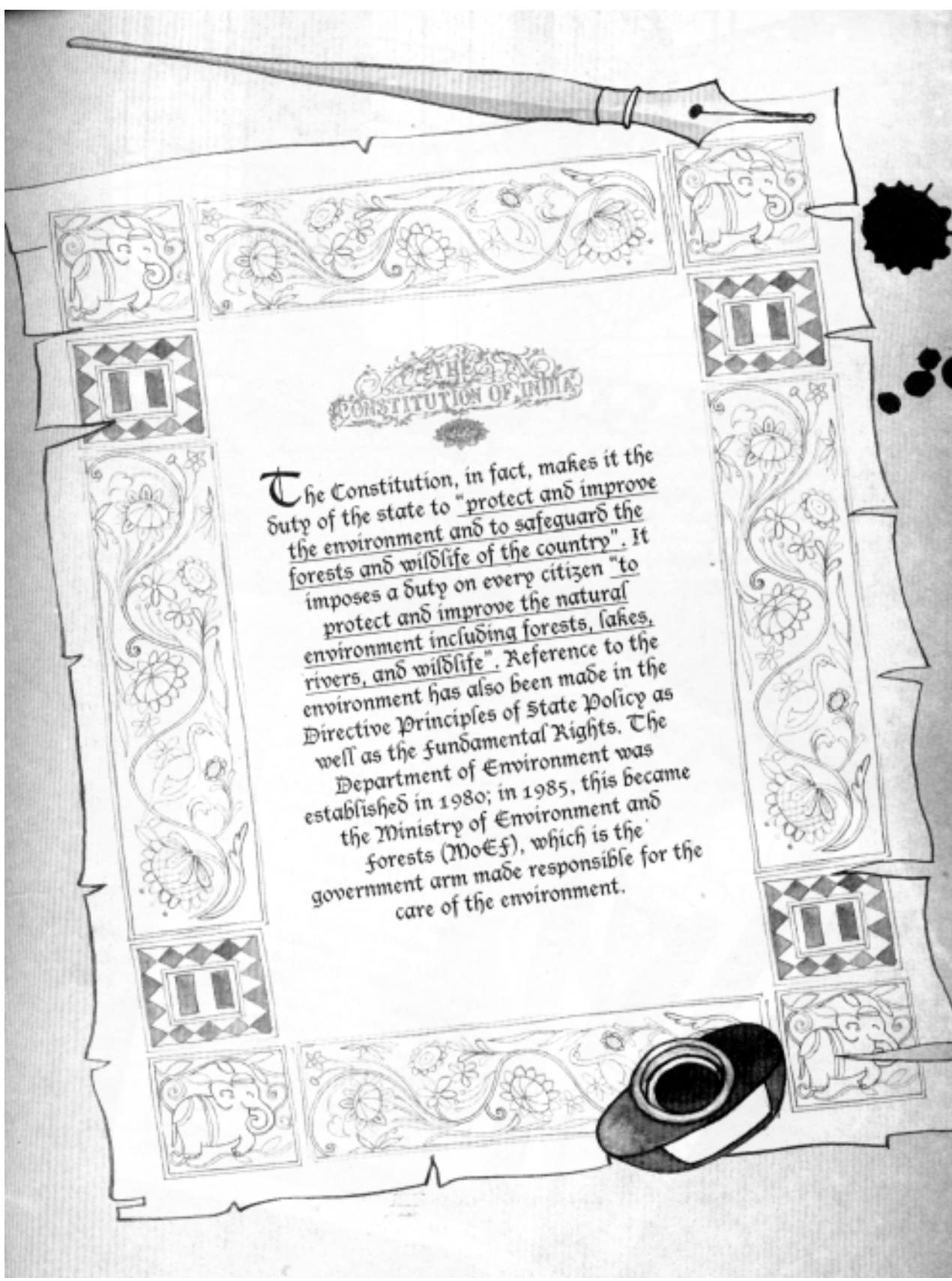


IT TOOK A DISASTER FOR THE ENVIRONMENT TO BECOME A SERIOUS CONCERN FOR INDIA'S LAWMAKERS. THE YEAR WAS 1984, AND THE EVENT WAS ONE OF THE WORST INDUSTRIAL ACCIDENTS IN HISTORY. THE UNION CARBIDE GAS LEAK AT BHOPAL, WHICH LEFT 20,000 PEOPLE DEAD AND A LEGACY OF DECADES OF PAIN AND SUFFERING FOR THOUSANDS OF OTHERS. IN THE WAKE OF THE DISASTER, A HANDFUL OF PREVIOUSLY-EXISTING LEGISLATIONS WAS COBBLED TOGETHER — AND GAPS FILLED — TO FORM THE ENVIRONMENT PROTECTION ACT (EPA), 1986.



THE EPA AUTHORIZED THE CENTRAL GOVERNMENT TO PROTECT AND IMPROVE ENVIRONMENTAL QUALITY, CONTROL AND REDUCE POLLUTION FROM ALL SOURCES, AND PROHIBIT OR RESTRICT THE SETTING UP AND OPERATION OF ANY INDUSTRIAL FACILITY ON ENVIRONMENTAL GROUNDS. THE ENVIRONMENT (PROTECTION) RULES FRAMED UNDER THE EPA LAID DOWN PROCEDURES FOR SETTING STANDARDS OF EMISSION OR DISCHARGE OF ENVIRONMENTAL POLLUTANTS.

THE EPA MARKED A CHANGE IN THE COUNTRY'S ATTITUDE TOWARDS ENVIRONMENTAL LEGISLATION. IT GENERATED A PLETHORA OF RULES AND REGULATIONS, AND FACILITATED DELEGATION OF POWERS FROM THE CENTRAL GOVERNMENT TO VARIOUS AGENCIES, BOTH CENTRAL AND STATE. IN DEALING WITH ENVIRONMENTAL CASES, THE COURTS BEGAN TO LITIGATE IN FAVOR OF A HEALTHY ENVIRONMENT, INVOKING THE RIGHT TO LIFE ENSHRINED IN ARTICLE 21 OF THE CONSTITUTION OF INDIA.

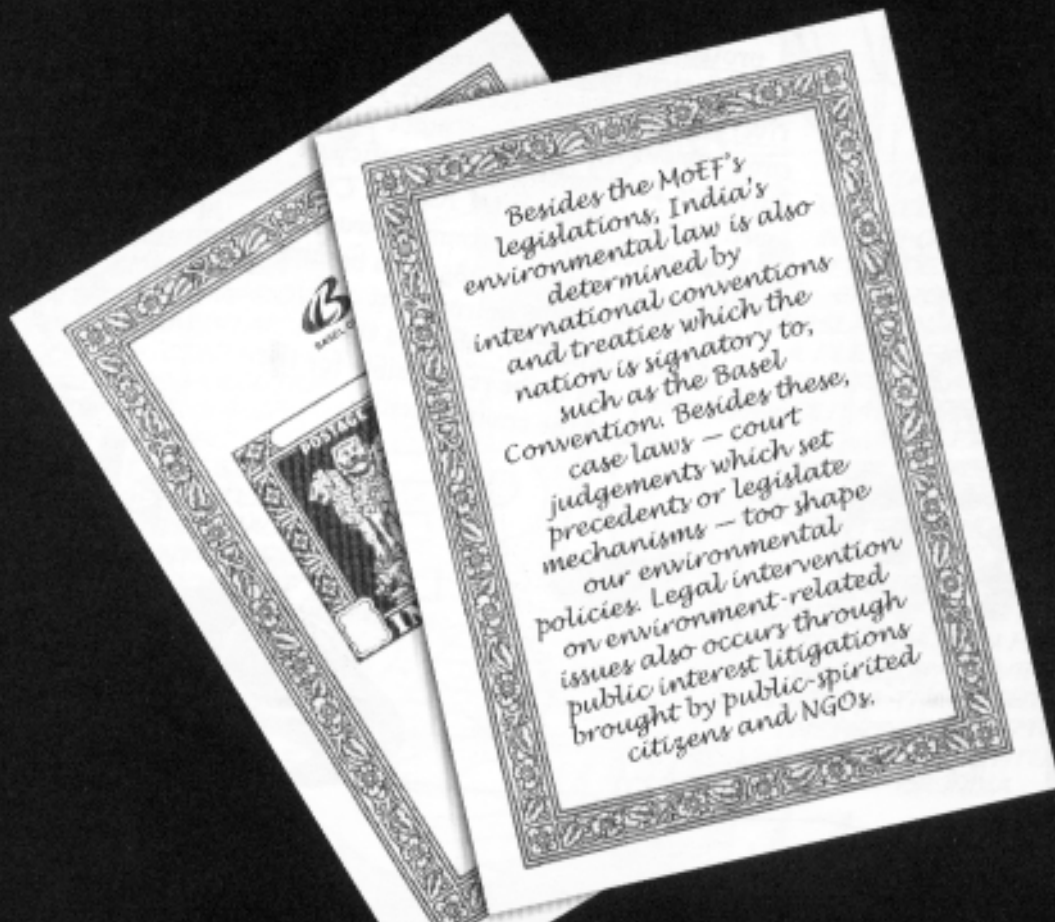


THE CONSTITUTION OF INDIA

The Constitution, in fact, makes it the duty of the state to "protect and improve the environment and to safeguard the forests and wildlife of the country". It imposes a duty on every citizen "to protect and improve the natural environment including forests, lakes, rivers, and wildlife". Reference to the environment has also been made in the Directive Principles of State Policy as well as the Fundamental Rights. The Department of Environment was established in 1980; in 1985, this became the Ministry of Environment and forests (MoEF), which is the government arm made responsible for the care of the environment.

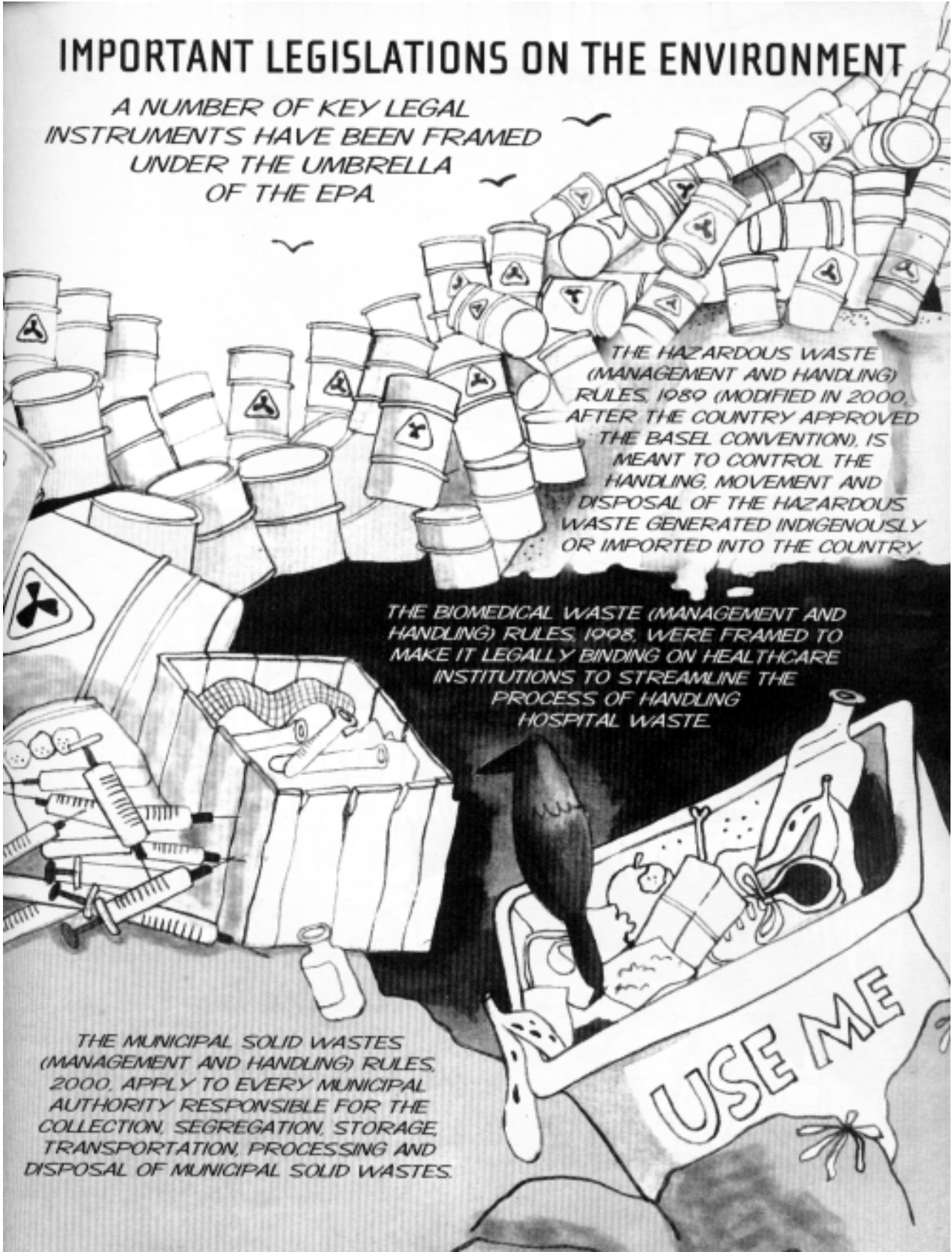


THE ROLE OF THE MOEF, HOWEVER, HAS LEFT MUCH SCOPE FOR CRITICISM, BOTH IN THE FRAMING OF LEGISLATIONS AND BILLS, AS WELL AS IMPLEMENTATION OF THE RULES AND REGULATIONS. ESPECIALLY IN THE INDUSTRY-FRIENDLY ATMOSPHERE OF INDIA'S LIBERALIZATION MOVES, THE MINISTRY IS OFTEN SEEN AS TAKING A STANCE AGAINST ITS CORE MANDATE. IN COMPARISON, OTHER NATIONS WHICH HAVE MADE STRIDES IN TACKLING ENVIRONMENTAL ISSUES HAVE REAPED THE BENEFITS OF GOOD DRAFTSMANSHIP AND STRINGENT IMPLEMENTATION OF THEIR LAWS.



IMPORTANT LEGISLATIONS ON THE ENVIRONMENT

A NUMBER OF KEY LEGAL INSTRUMENTS HAVE BEEN FRAMED UNDER THE UMBRELLA OF THE EPA



THE HAZARDOUS WASTE (MANAGEMENT AND HANDLING) RULES, 1989 (MODIFIED IN 2000, AFTER THE COUNTRY APPROVED THE BASEL CONVENTION), IS MEANT TO CONTROL THE HANDLING, MOVEMENT AND DISPOSAL OF THE HAZARDOUS WASTE GENERATED INDIGENOUSLY OR IMPORTED INTO THE COUNTRY.

THE BIOMEDICAL WASTE (MANAGEMENT AND HANDLING) RULES, 1998, WERE FRAMED TO MAKE IT LEGALLY BINDING ON HEALTHCARE INSTITUTIONS TO STREAMLINE THE PROCESS OF HANDLING HOSPITAL WASTE.

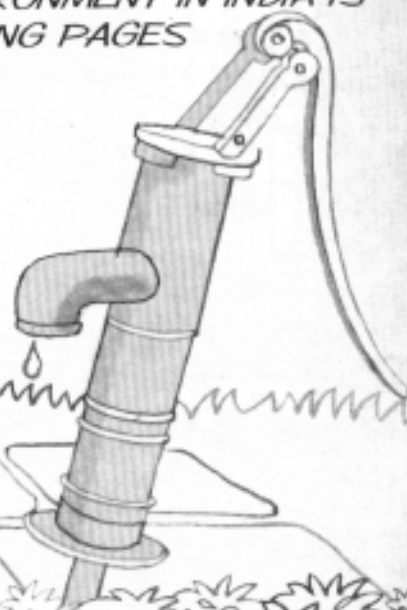
THE MUNICIPAL SOLID WASTES (MANAGEMENT AND HANDLING) RULES, 2000, APPLY TO EVERY MUNICIPAL AUTHORITY RESPONSIBLE FOR THE COLLECTION, SEGREGATION, STORAGE, TRANSPORTATION, PROCESSING AND DISPOSAL OF MUNICIPAL SOLID WASTES.

A TIMELINE OF OTHER LEGISLATIONS THAT HAVE HAD AN IMPACT ON THE STATE OF THE ENVIRONMENT IN INDIA IS OUTLINED ON THE FOLLOWING PAGES



1882

THE EASEMENT ACT ALLOWED PRIVATE RIGHTS TO USE A NATURAL RESOURCE — GROUNDWATER — BY VIEWING IT AS AN ATTACHMENT TO THE LAND. IT ALSO STATED THAT ALL SURFACE WATER BELONGS TO THE STATE AND IS A STATE PROPERTY.



1927

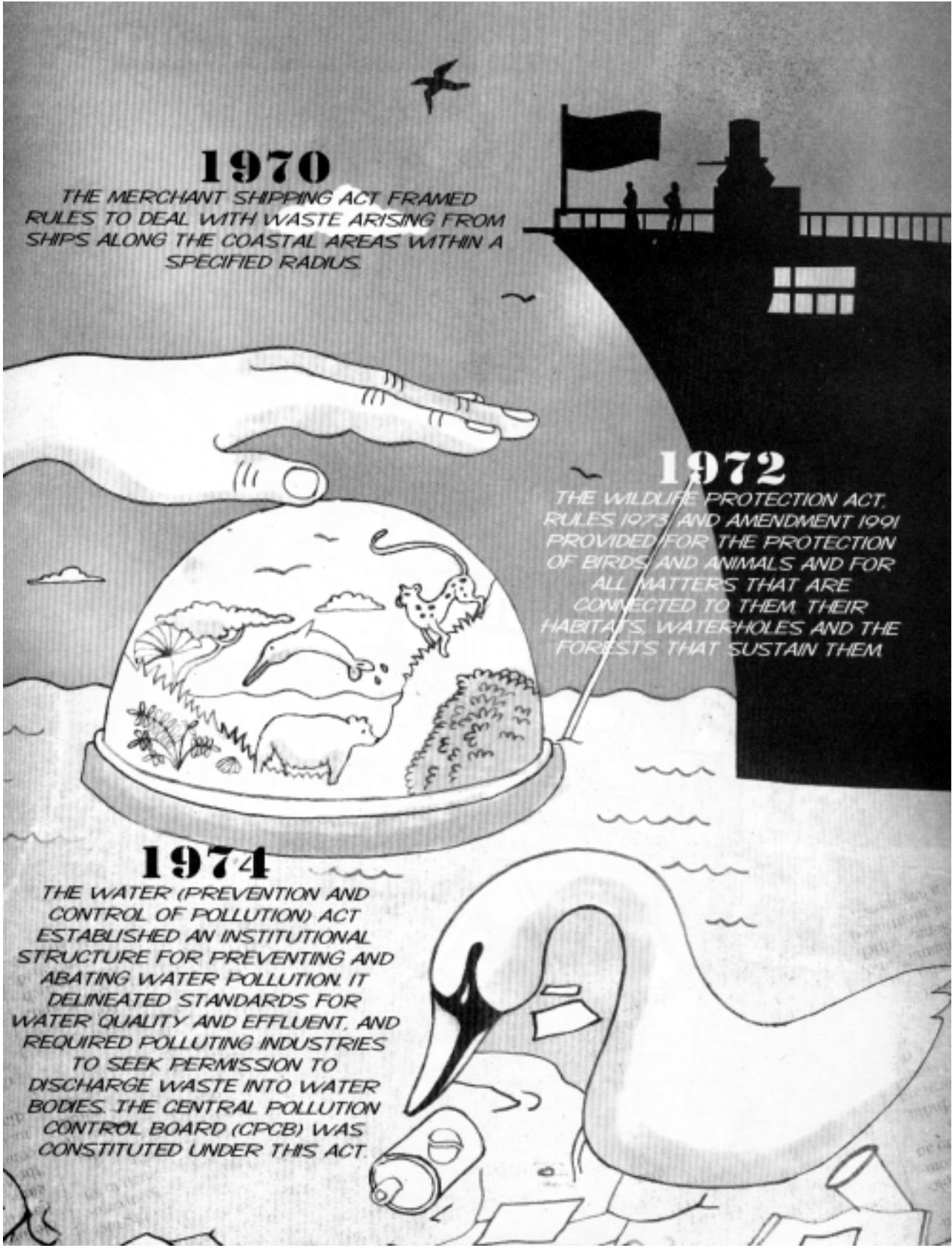
THE INDIAN FOREST ACT (AMENDED IN 1984), IS ONE OF THE MANY SURVIVING COLONIAL STATUTES. IT WAS ENACTED TO "CONSOLIDATE THE LAW RELATED TO FOREST, THE TRANSIT OF FOREST PRODUCE, AND THE DUTY LEVIABLE ON TIMBER AND OTHER FOREST PRODUCE".



1948

THE FACTORIES ACT WAS THE FIRST TO EXPRESS CONCERN FOR THE WORKING ENVIRONMENT OF WORKERS. ITS AMENDMENT IN 1987 SHARPENED ITS ENVIRONMENTAL FOCUS AND EXPANDED ITS APPLICATION TO HAZARDOUS PROCESSES.





1970

THE MERCHANT SHIPPING ACT FRAMED RULES TO DEAL WITH WASTE ARISING FROM SHIPS ALONG THE COASTAL AREAS WITHIN A SPECIFIED RADIUS.

1972

THE WILDLIFE PROTECTION ACT, RULES 1973 AND AMENDMENT 1991 PROVIDED FOR THE PROTECTION OF BIRDS AND ANIMALS AND FOR ALL MATTERS THAT ARE CONNECTED TO THEM, THEIR HABITATS, WATERHOLES AND THE FORESTS THAT SUSTAIN THEM.

1974

THE WATER (PREVENTION AND CONTROL OF POLLUTION) ACT ESTABLISHED AN INSTITUTIONAL STRUCTURE FOR PREVENTING AND ABATING WATER POLLUTION. IT DELINEATED STANDARDS FOR WATER QUALITY AND EFFLUENT, AND REQUIRED POLLUTING INDUSTRIES TO SEEK PERMISSION TO DISCHARGE WASTE INTO WATER BODIES. THE CENTRAL POLLUTION CONTROL BOARD (CPCB) WAS CONSTITUTED UNDER THIS ACT.



1980

THE FOREST (CONSERVATION)
ACT AND RULES, 1981, PROVIDED
FOR THE PROTECTION AND
CONSERVATION OF FORESTS.

1981

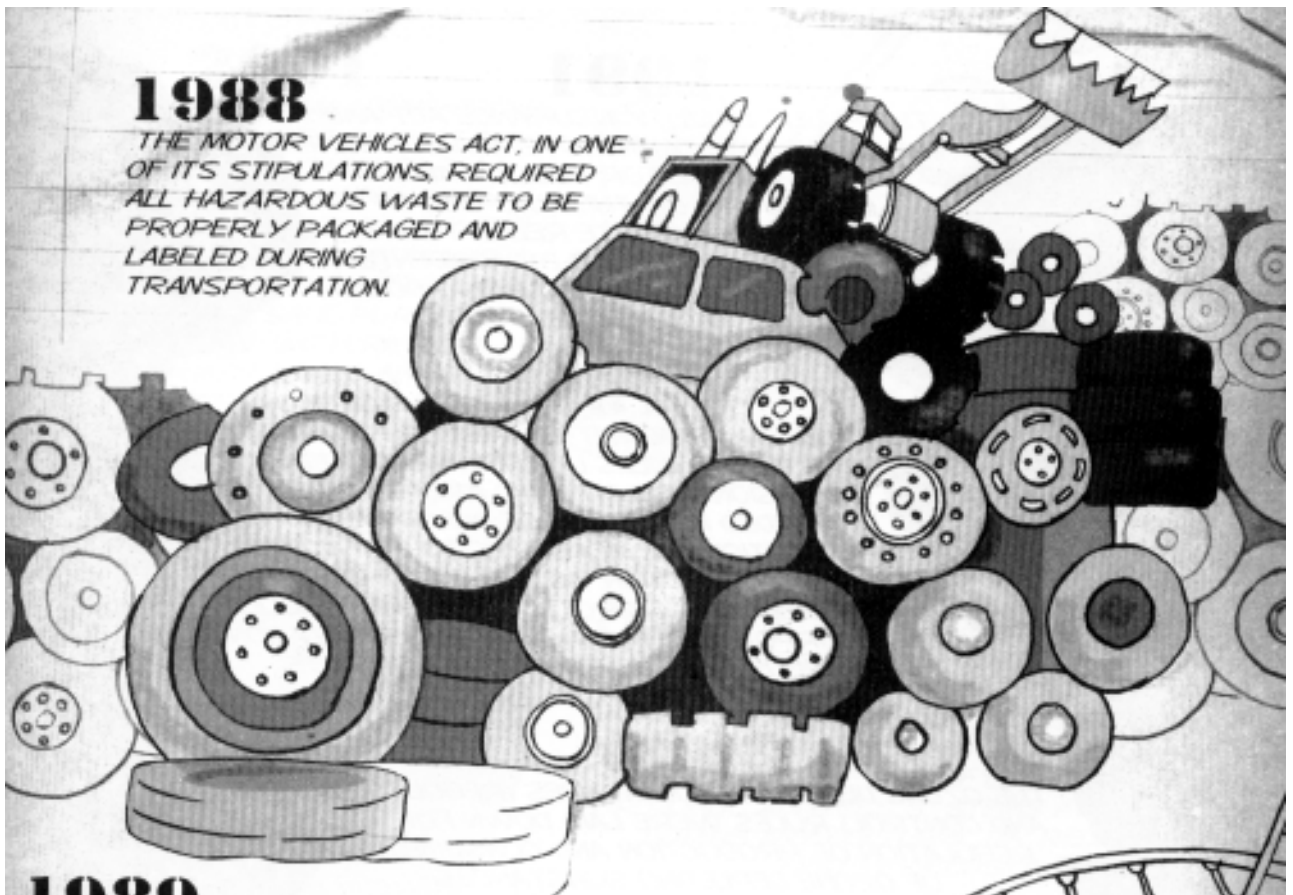
THE AIR (PREVENTION
AND CONTROL OF
POLLUTION) ACT
PROVIDED FOR THE
CONTROL AND
ABATEMENT OF AIR
POLLUTION. IT
ENTRUSTED THE
POWER OF
ENFORCING THIS ACT
TO THE CPCB.

1982

THE ATOMIC ENERGY
ACT WAS FRAMED TO
DEAL WITH THE
PROBLEM OF
RADIOACTIVE WASTE.

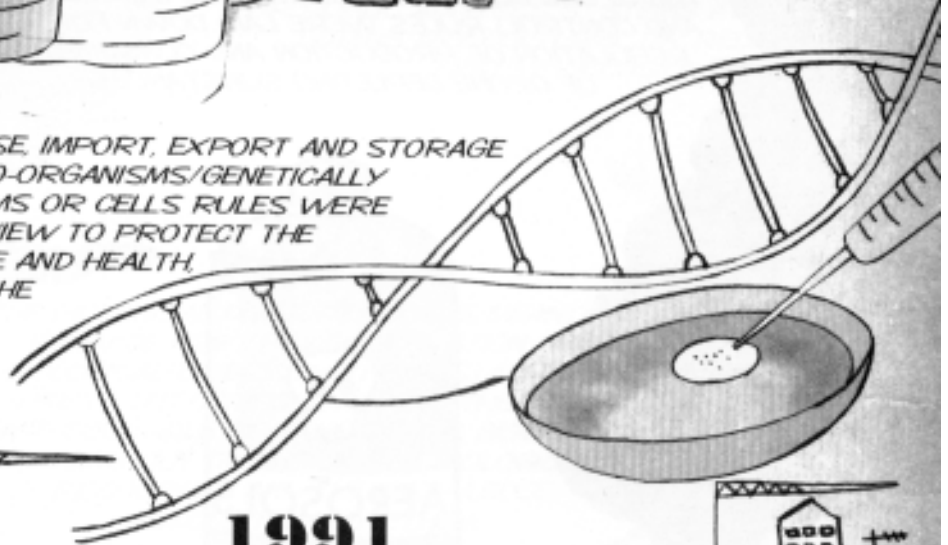
1988

THE MOTOR VEHICLES ACT, IN ONE OF ITS STIPULATIONS, REQUIRED ALL HAZARDOUS WASTE TO BE PROPERLY PACKAGED AND LABELED DURING TRANSPORTATION.



1989

THE MANUFACTURE, USE, IMPORT, EXPORT AND STORAGE OF HAZARDOUS MICRO-ORGANISMS/GENETICALLY ENGINEERED ORGANISMS OR CELLS RULES WERE INTRODUCED WITH A VIEW TO PROTECT THE ENVIRONMENT, NATURE AND HEALTH IN CONNECTION WITH THE APPLICATION OF GENE TECHNOLOGY AND MICRO-ORGANISMS.



1991

THE COASTAL REGULATION ZONE NOTIFICATION PLACED RESTRICTIONS ON VARIOUS ACTIVITIES, INCLUDING CONSTRUCTION, ALONG THE COASTAL ZONE. IT ALSO PROVIDED SOME PROTECTION TO THE BACKWATERS AND ESTUARIES.



1991

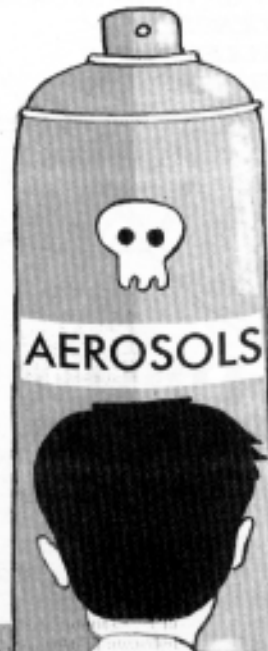
THE PUBLIC LIABILITY INSURANCE ACT AND RULES AND AMENDMENT, 1992, WAS DRAWN UP TO PROVIDE FOR PUBLIC LIABILITY INSURANCE FOR THE PURPOSE OF PROVIDING IMMEDIATE RELIEF TO THE PERSONS AFFECTED BY ACCIDENTS WHILE HANDLING ANY HAZARDOUS SUBSTANCE.

1999

THE ENVIRONMENT (SITING FOR INDUSTRIAL PROJECTS) RULES LAY DOWN DETAILED PROVISIONS RELATING TO AREAS TO BE AVOIDED FOR SITING OF INDUSTRIES. PRECAUTIONARY MEASURES TO BE TAKEN FOR SITE SELECTION, AS WELL AS ASPECTS OF ENVIRONMENTAL PROTECTION WHICH SHOULD BE INCORPORATED DURING THE IMPLEMENTATION OF INDUSTRIAL DEVELOPMENT PROJECTS.

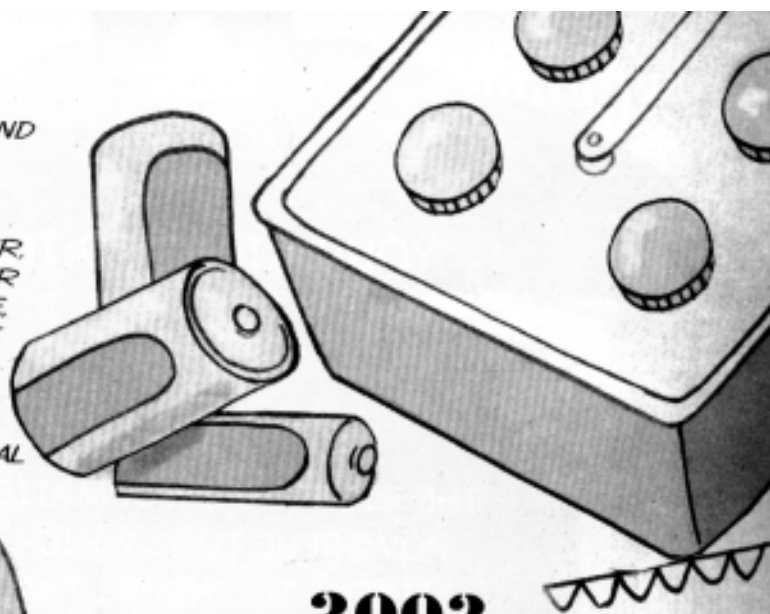
2000

THE OZONE DEPLETING SUBSTANCES (REGULATION AND CONTROL) RULES WERE LAID DOWN FOR THE REGULATION OF PRODUCTION AND CONSUMPTION OF OZONE DEPLETING SUBSTANCES.



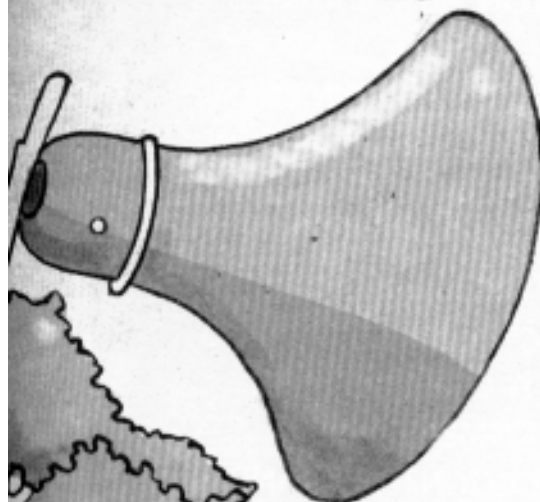
2001

THE BATTERIES (MANAGEMENT AND HANDLING) RULES APPLY TO EVERY MANUFACTURER, IMPORTER, RE-CONDITIONER, ASSEMBLER, DEALER, AUCTIONEER, CONSUMER AND BULK CONSUMER INVOLVED IN THE MANUFACTURE, PROCESSING, SALE, PURCHASE AND USE OF BATTERIES OR COMPONENTS, AND AIM TO REGULATE AND ENSURE THE ENVIRONMENTALLY SAFE DISPOSAL OF USED BATTERIES.



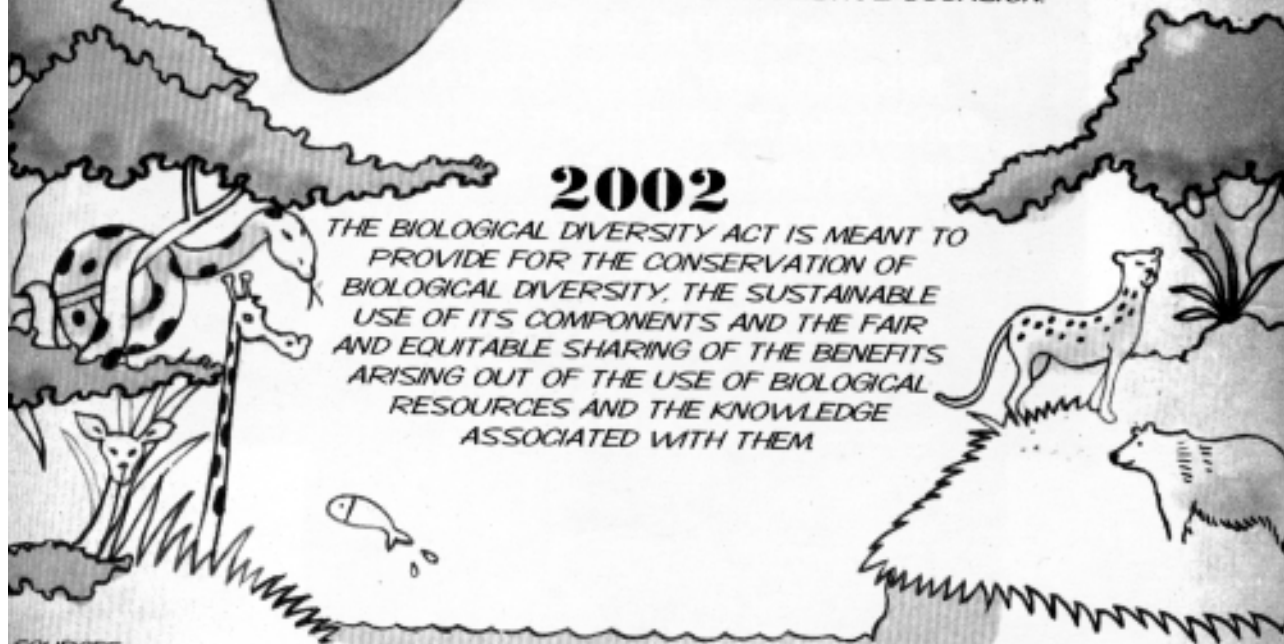
2002

THE NOISE POLLUTION (REGULATION AND CONTROL) (AMENDMENT) RULES LAY DOWN SUCH TERMS AND CONDITIONS AS ARE NECESSARY TO REDUCE NOISE POLLUTION, AND TO LIMIT THE USE OF LOUDSPEAKERS OR PUBLIC ADDRESS SYSTEMS AT NIGHT OR DURING ANY CULTURAL OR RELIGIOUS FESTIVE OCCASION.



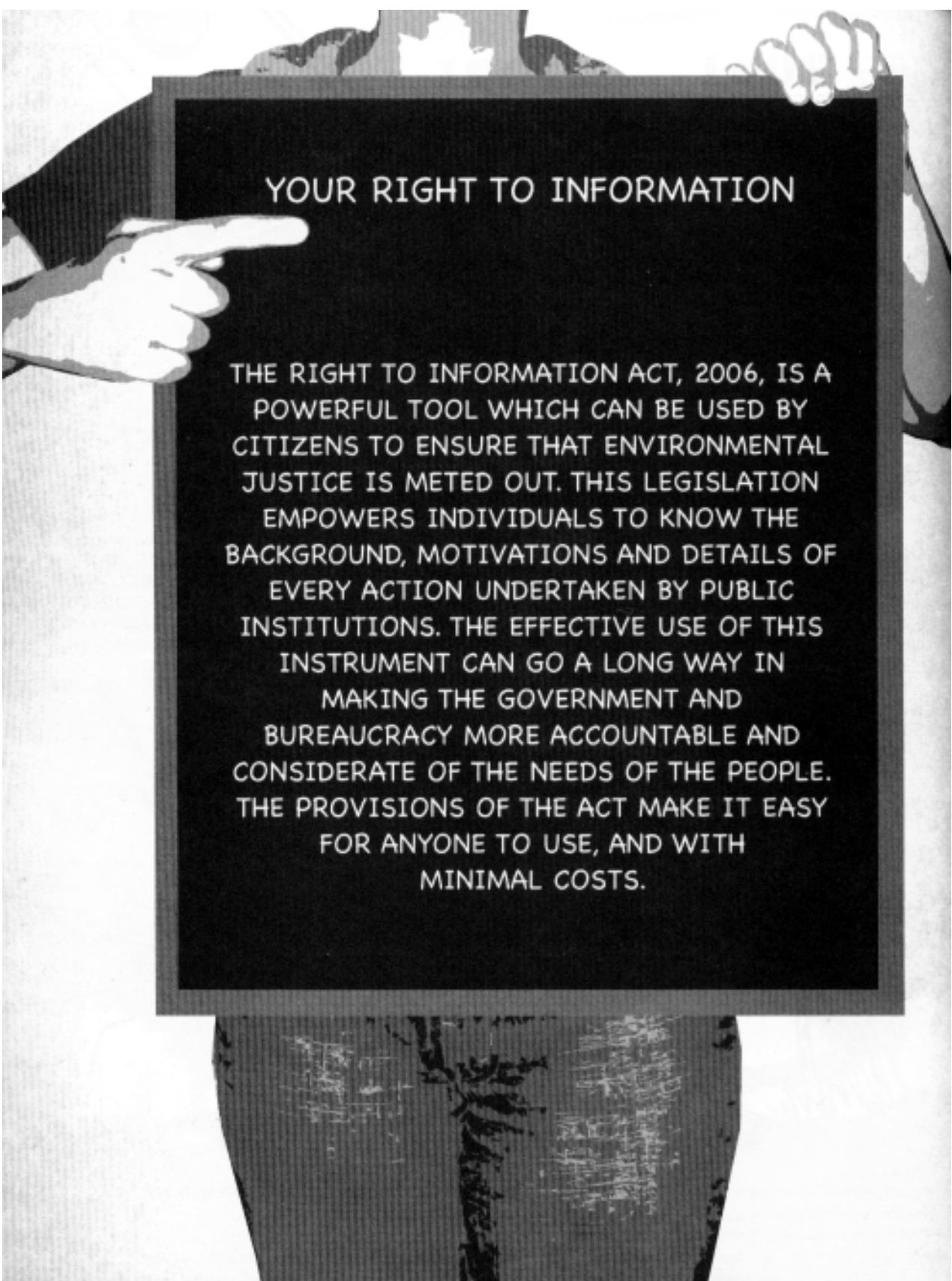
2002

THE BIOLOGICAL DIVERSITY ACT IS MEANT TO PROVIDE FOR THE CONSERVATION OF BIOLOGICAL DIVERSITY, THE SUSTAINABLE USE OF ITS COMPONENTS AND THE FAIR AND EQUITABLE SHARING OF THE BENEFITS ARISING OUT OF THE USE OF BIOLOGICAL RESOURCES AND THE KNOWLEDGE ASSOCIATED WITH THEM.



SOURCES

- * "ENVIRONMENTAL POLICY-MAKING IN INDIA — THE PROCESS AND ITS PRESSURE", TERI REPORT.
- * INDIAN ENVIRONMENTAL LEGISLATIONS LIST FROM THE MOEF WEBSITE
- * "STRENGTHENING ENVIRONMENTAL LEGISLATIONS IN INDIA", DOCUMENT BY THE CENTRE FOR ENVIRONMENTAL LAW, WORLDWIDE FUND FOR NATURE (WWF).

A black and white photograph of a person holding a large, dark rectangular sign. The person's hands are visible at the top corners of the sign, and their torso is visible at the bottom. The sign has white text on it. The background is a light, textured surface.

YOUR RIGHT TO INFORMATION

THE RIGHT TO INFORMATION ACT, 2006, IS A POWERFUL TOOL WHICH CAN BE USED BY CITIZENS TO ENSURE THAT ENVIRONMENTAL JUSTICE IS METED OUT. THIS LEGISLATION EMPOWERS INDIVIDUALS TO KNOW THE BACKGROUND, MOTIVATIONS AND DETAILS OF EVERY ACTION UNDERTAKEN BY PUBLIC INSTITUTIONS. THE EFFECTIVE USE OF THIS INSTRUMENT CAN GO A LONG WAY IN MAKING THE GOVERNMENT AND BUREAUCRACY MORE ACCOUNTABLE AND CONSIDERATE OF THE NEEDS OF THE PEOPLE. THE PROVISIONS OF THE ACT MAKE IT EASY FOR ANYONE TO USE, AND WITH MINIMAL COSTS.

INTERNATIONAL CONVENTIONS ON ENVIRONMENT

TWO GLOBAL CONVENTIONS WHICH HAVE HAD A BEARING ON THE STATE OF THE ENVIRONMENT AND ITS LEGISLATION IN SIGNATORY COUNTRIES, INCLUDING INDIA, ARE THE BASEL CONVENTION AND THE STOCKHOLM CONVENTION.

THE STOCKHOLM CONVENTION,

1995,
IS AN INTERNATIONAL LEGALLY
BINDING AGREEMENT ON PERSISTENT
ORGANIC POLLUTANTS (POPS). IN
1995, THE GOVERNING COUNCIL OF
THE UNITED NATIONS ENVIRONMENT
PROGRAMME (UNEP) CALLED FOR
GLOBAL ACTION TO BE TAKEN ON
POPS, WHICH IT DEFINED AS
"CHEMICAL SUBSTANCES THAT
PERSIST IN THE ENVIRONMENT,
BIO-ACCUMULATE THROUGH THE
FOOD WEB, AND POSE A RISK OF
CAUSING ADVERSE EFFECTS
TO HUMAN HEALTH AND THE
ENVIRONMENT." THE CONVENTION
ENTERED INTO FORCE ON MAY 17,
2004, WITH RATIFICATION BY AN
INITIAL 128 PARTIES AND
151 SIGNATORIES.

THE BASEL CONVENTION

ON THE CONTROL OF
TRANSBOUNDARY MOVEMENT OF
HAZARDOUS WASTES
AND THEIR DISPOSAL IN FORCE SINCE
1992, HAS BEEN SIGNED BY ABOUT
165 NATIONAL GOVERNMENTS. THE GLOBAL
AGREEMENT REGULATES TRADE IN
HAZARDOUS WASTES; IT SEEKS TO
ENSURE THAT THEY ARE DISPOSED OF
SAFELY AND THAT THEIR GENERATION IS
MINIMIZED. AN AMENDMENT TO THE
CONVENTION, COMMONLY KNOWN AS
THE BASEL BAN, WHICH CALLS FOR
PROHIBITING THE EXPORT OF
HAZARDOUS WASTE FROM
ORGANISATION FOR ECONOMIC
CO-OPERATION AND DEVELOPMENT
(OECD) TO NON-OECD COUNTRIES, IS
STILL TO COME INTO FORCE. INDIA
RATIFIED THE CONVENTION IN 1990.

BESIDES THESE, THE EUROPEAN UNION (EU) HAS ENACTED TWO DIRECTIVES, THE FIRST ON PRODUCT RECYCLING (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT OR WEEE) AND THE SECOND LIMITING THE USE OF CERTAIN SUBSTANCES (RESTRICTION ON THE USE OF HAZARDOUS SUBSTANCES OR ROHS). SINCE AUGUST 2005, THESE DIRECTIVES HAVE BEEN IMPLEMENTED IN THE NATIONAL LAWS OF EACH EU MEMBER STATE.

WEEE

THE PURPOSE OF THE WEEE DIRECTIVE IS, AS A FIRST PRIORITY, REDUCTION IN THE LEVELS OF WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT, AND IN ADDITION, THE REUSE, RECYCLING AND OTHER FORMS OF RECOVERY OF SUCH WASTES. THE DIRECTIVE REQUIRES ALL PRODUCERS OF ELECTRICAL AND ELECTRONIC EQUIPMENT TO PROVIDE A GUARANTEE ON THE MANAGEMENT OF ALL WASTE RESULTING FROM IT. PRODUCER RESPONSIBILITY INCLUDES MEETING LABELING REQUIREMENTS, PROVIDING INFORMATION TO END-USERS AND TREATMENT FACILITIES, ENSURING AVAILABILITY OF COLLECTION INFRASTRUCTURE, SUBMITTING SALES AND RECOVERY DATA, AND FINANCING WEEE COSTS.

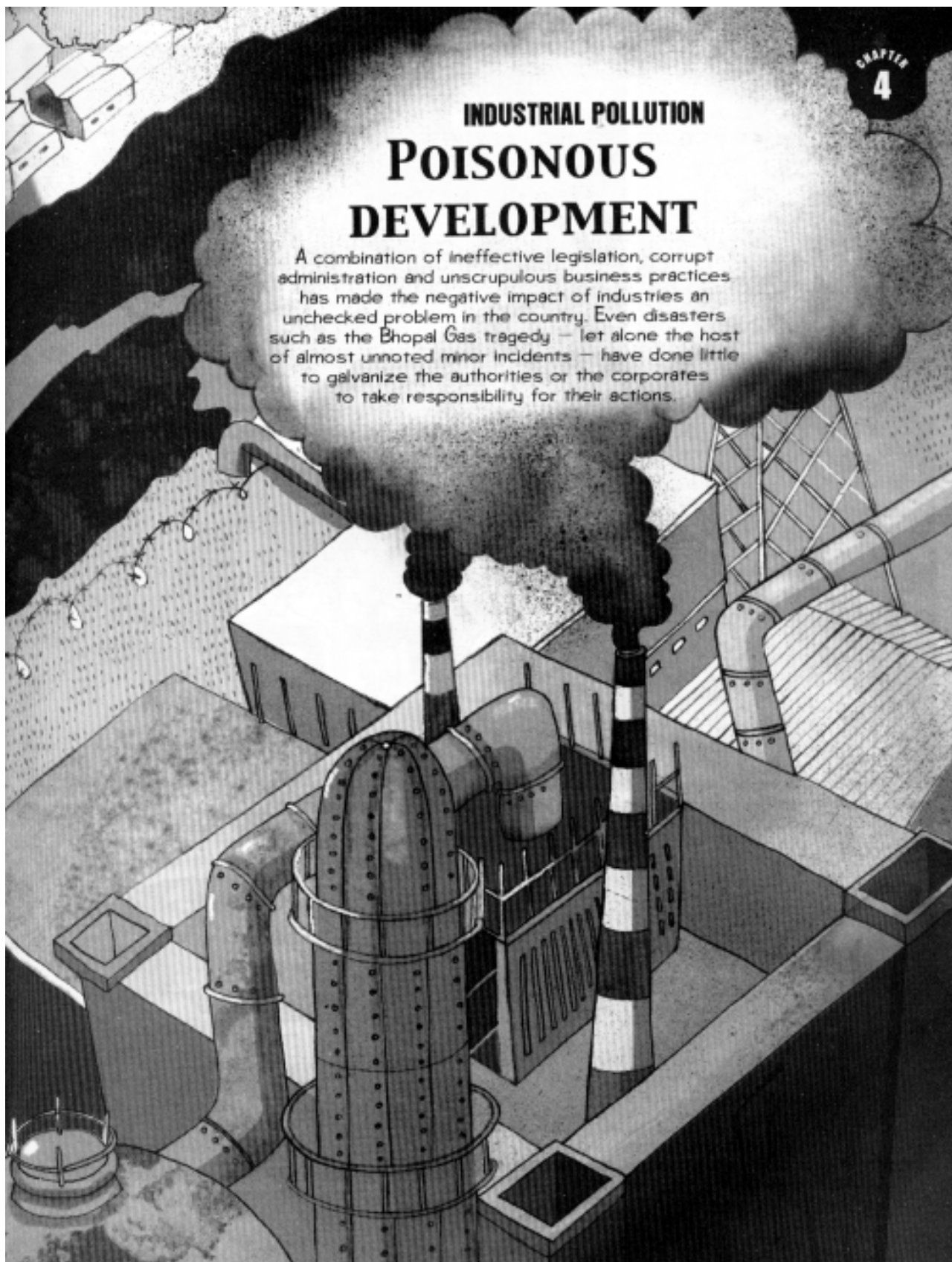
ROHS

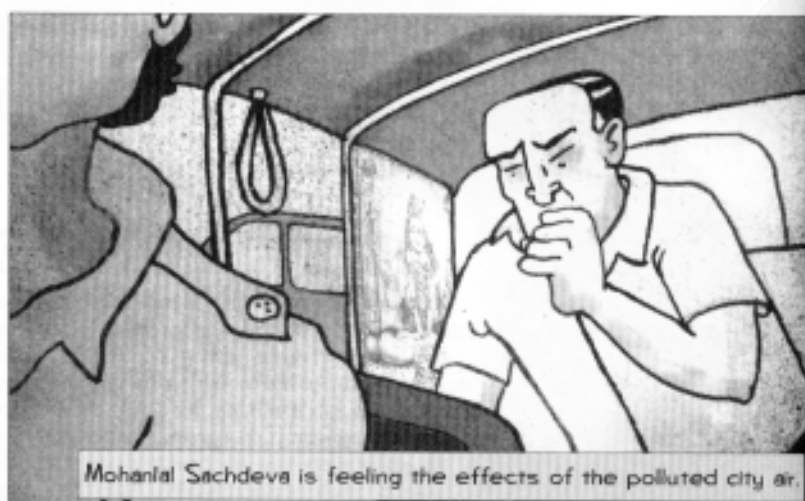
THE ROHS DIRECTIVE IS AIMED AT RESTRICTING THE USE OF HAZARDOUS SUBSTANCES IN ELECTRICAL AND ELECTRONIC EQUIPMENT. THE DIRECTIVE, IT IS HOPED, WILL CONTRIBUTE TO THE PROTECTION OF HUMAN HEALTH AND TO THE ENVIRONMENTALLY SOUND RECOVERY AND DISPOSAL OF WASTE FROM ELECTRICAL AND ELECTRONIC EQUIPMENT.

INDUSTRIAL POLLUTION

POISONOUS DEVELOPMENT

A combination of ineffective legislation, corrupt administration and unscrupulous business practices has made the negative impact of industries an unchecked problem in the country. Even disasters such as the Bhopal Gas tragedy — let alone the host of almost unnoted minor incidents — have done little to galvanize the authorities or the corporates to take responsibility for their actions.





Mohanlal Sachdeva is feeling the effects of the polluted city air.



Ironic, since it's a polluting factory he is going to inspect and possibly give clearance to.



Why did the car have to have problems today?

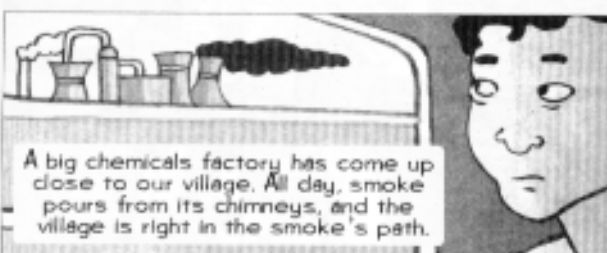
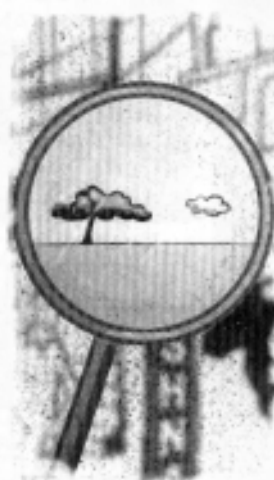


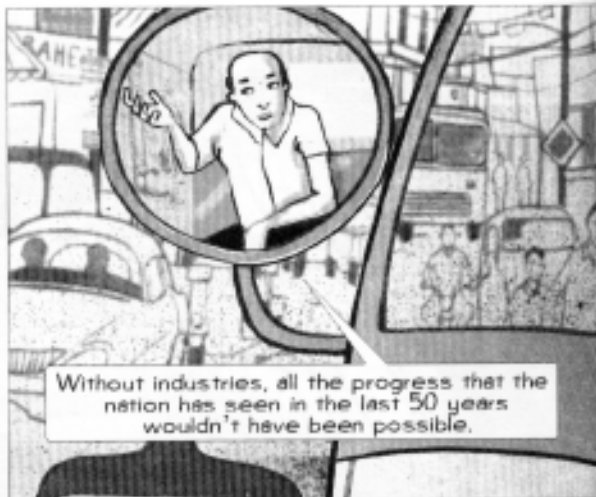
The air in this city has become unbearable.

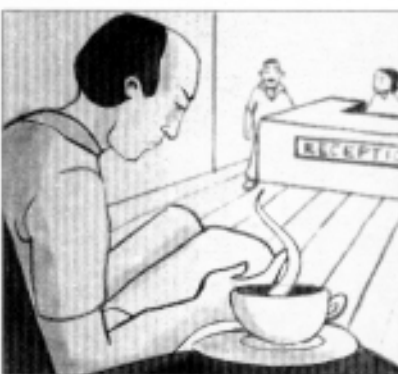
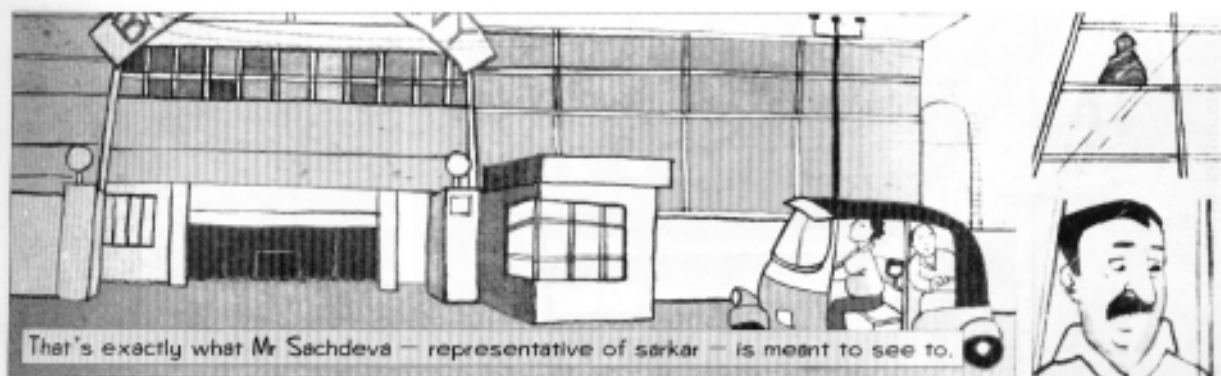
You said it, saheb. I have to drive in it every day. When I get home, I feel like I've been smoking non-stop all day. And I don't even touch beedis or cigarettes."

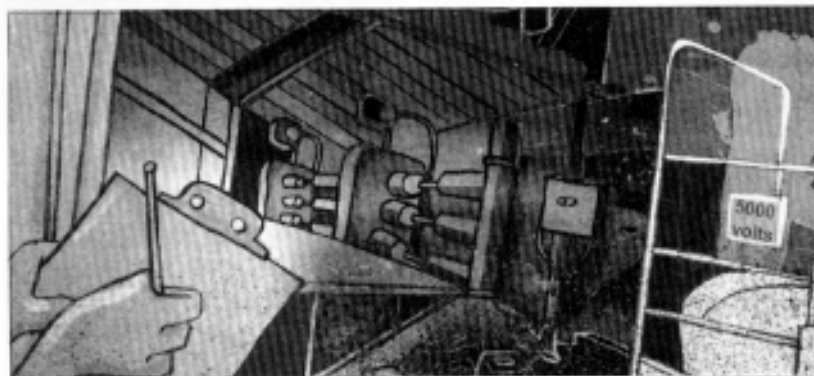
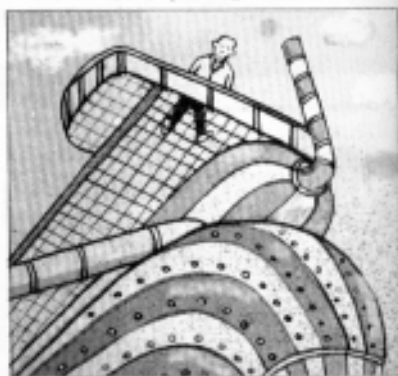
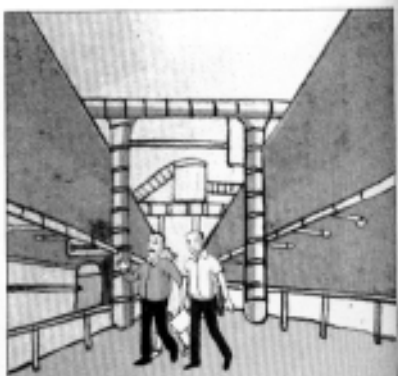
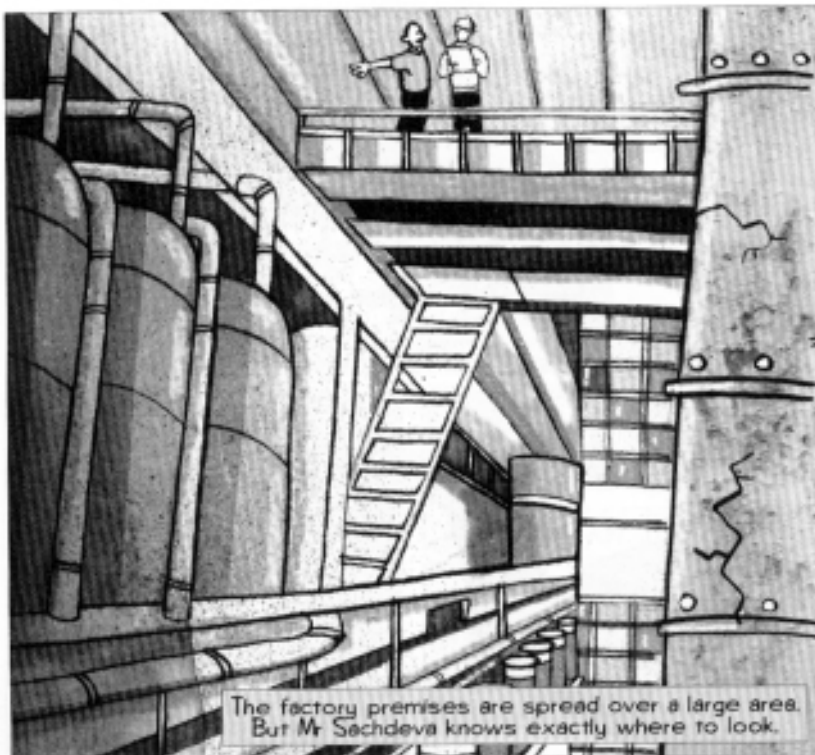


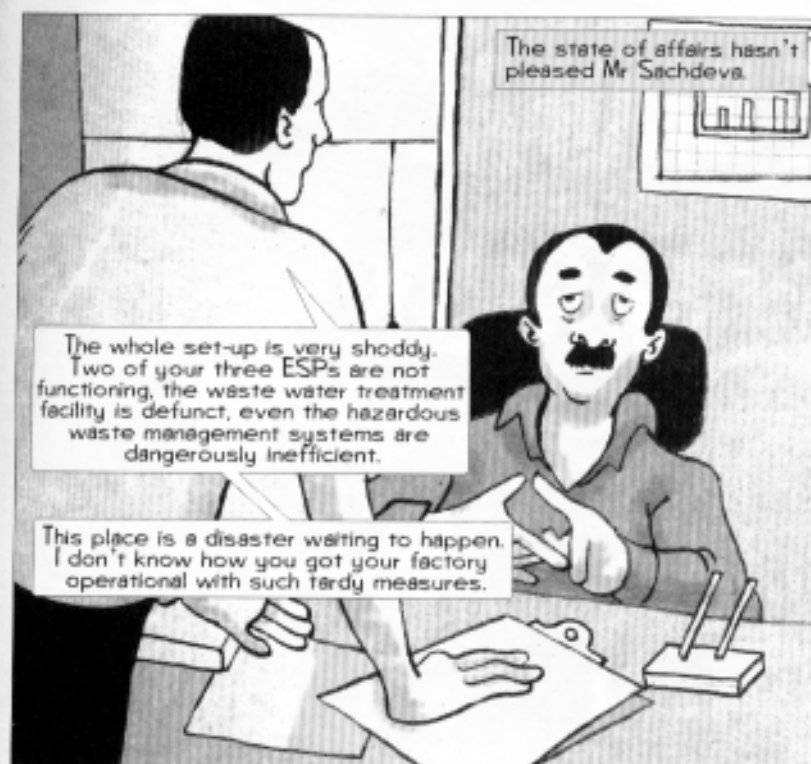
This must be very bad for your health. How long have you been driving this auto?











The state of affairs hasn't pleased Mr Sachdeva.

The whole set-up is very shoddy. Two of your three ESPs are not functioning, the waste water treatment facility is defunct, even the hazardous waste management systems are dangerously inefficient.

This place is a disaster waiting to happen. I don't know how you got your factory operational with such tardy measures.



A little grease on the right palms will get anything passed. And if you think all these objections will raise your price, you're sadly mistaken.

After all, why spend lakhs on an electrostatic precipitator when an official signature only costs a few thousands?



Sachdeva sahab, it's just a question of a signature. And we can make it quite worthwhile for you to sign your name.



But every once in a while, the palmgreasers come up against those whose hands are Teflon-coated, and find that nothing sticks there.

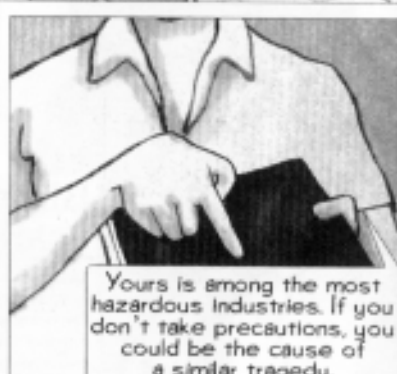
I'm sorry — my name is too valuable for me to sell. Besides, I know first-hand what is at stake.



One of my best friends was in Bhopal when the Union Carbide gas leak took place.



This is a folder he created — before the events of that night claimed his life, three years afterwards.



Yours is among the most hazardous industries. If you don't take precautions, you could be the cause of a similar tragedy.

THE BHOPAL GAS TRAGEDY



No relief for Bhopal victims

Arguing that chromosomal deviation among people exposed to toxic gases from the Union Carbide plant was causing birth defects among their children, survivors of the Bhopal gas tragedy Sunday demanded free treatment of the children and a monthly pension of Rs. 1000 from the state.

Last year the Trust identified 100 children with 200 kinds of defects in the groundwaters exposed to toxic gases. Later, specialised camp in New Delhi Bhopal, camp in 2006.



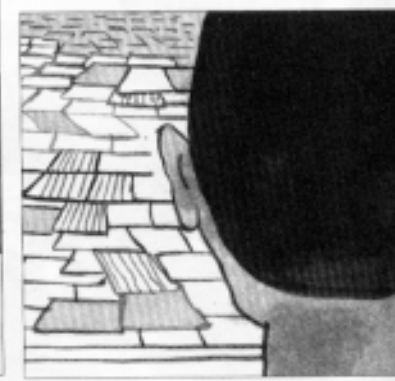
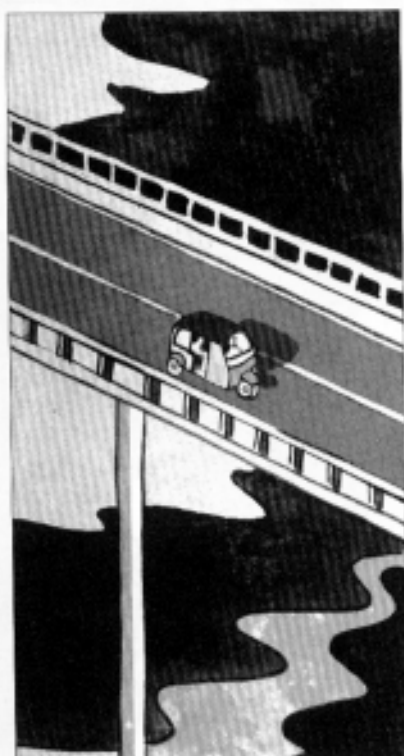
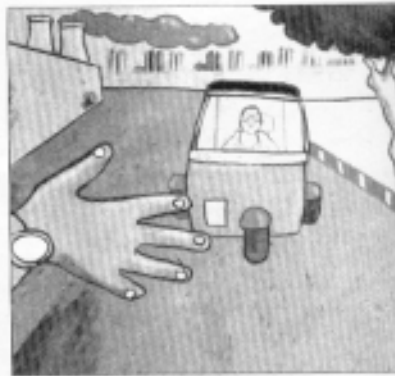
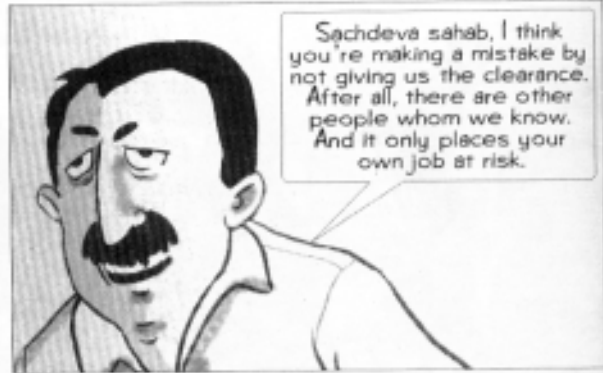
Bhopal eighteen years on

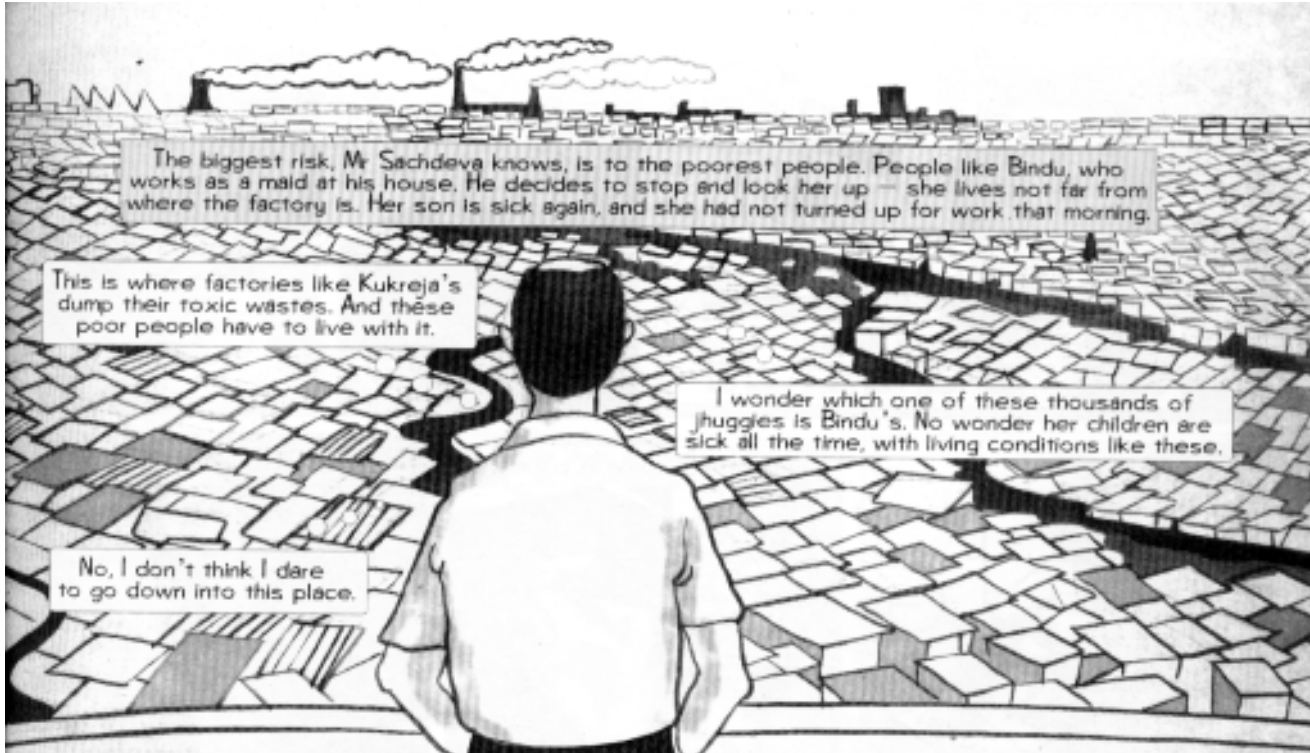
Eighteen years have gone by since the Bhopal Gas tragedy. The victims of the biggest industrial accident are yet to receive justice. "The Bhopal Gas Tragedy" has been lost in the collective consciousness of the nation. Yes, life has to go on - we must fight epidemics and offer prayers for the victims of

other day at Bhopal Junction the heart of Central Railway operations. It was a pleasant heating winter morning and it was... Business as usual. The 00-00 hours to 08-00 hours shift in the Control Office was busy trying up the same end of the previous day's operations and gather...

WANTED by the BOPAL COURTS for MOMICIDE





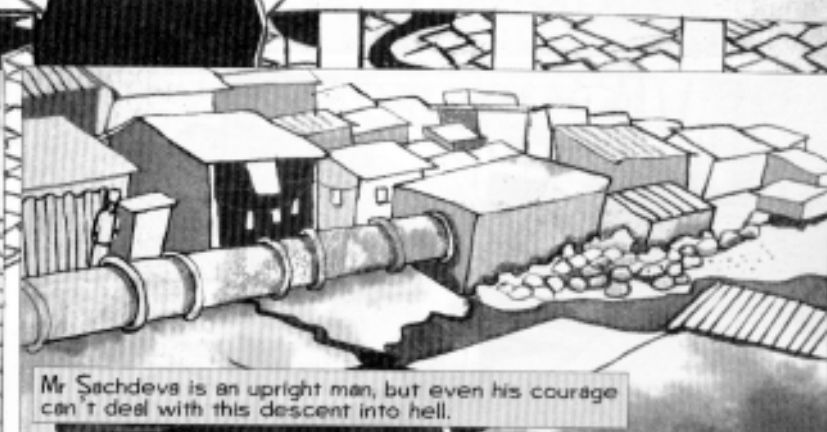


The biggest risk, Mr Sachdeva knows, is to the poorest people. People like Bindu, who works as a maid at his house. He decides to stop and look her up — she lives not far from where the factory is. Her son is sick again, and she had not turned up for work that morning.

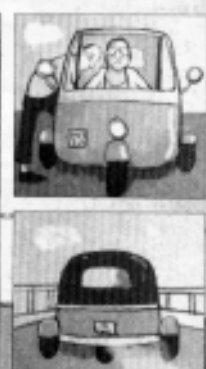
This is where factories like Kukreja's dump their toxic wastes. And these poor people have to live with it.

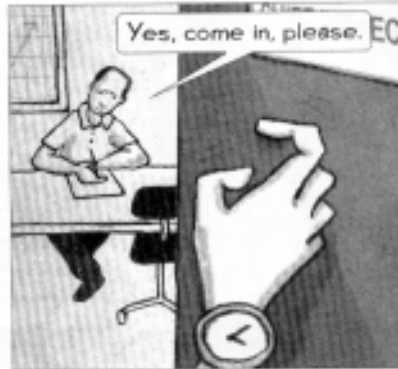
I wonder which one of these thousands of jhuggies is Bindu's. No wonder her children are sick all the time, with living conditions like these.

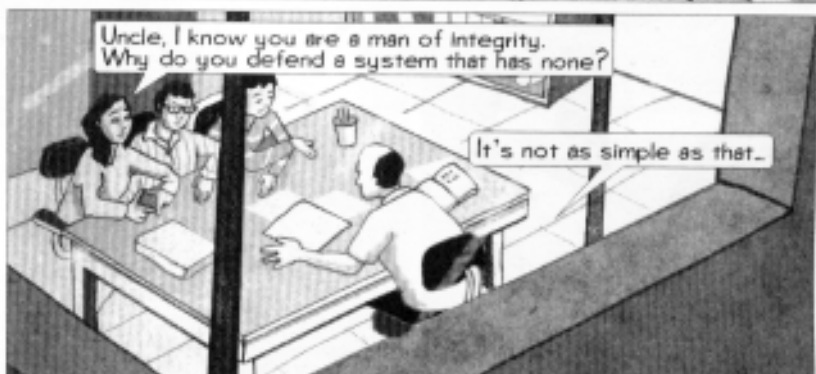
No, I don't think I dare to go down into this place.

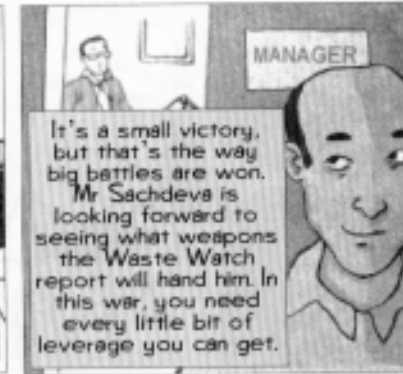
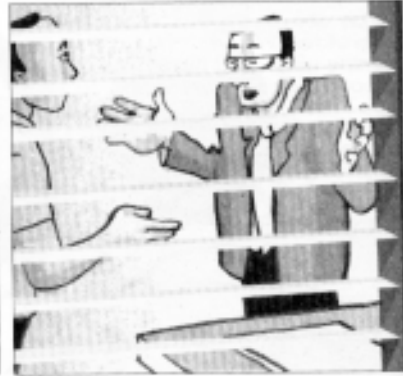


Mr Sachdeva is an upright man, but even his courage can't deal with this descent into hell.



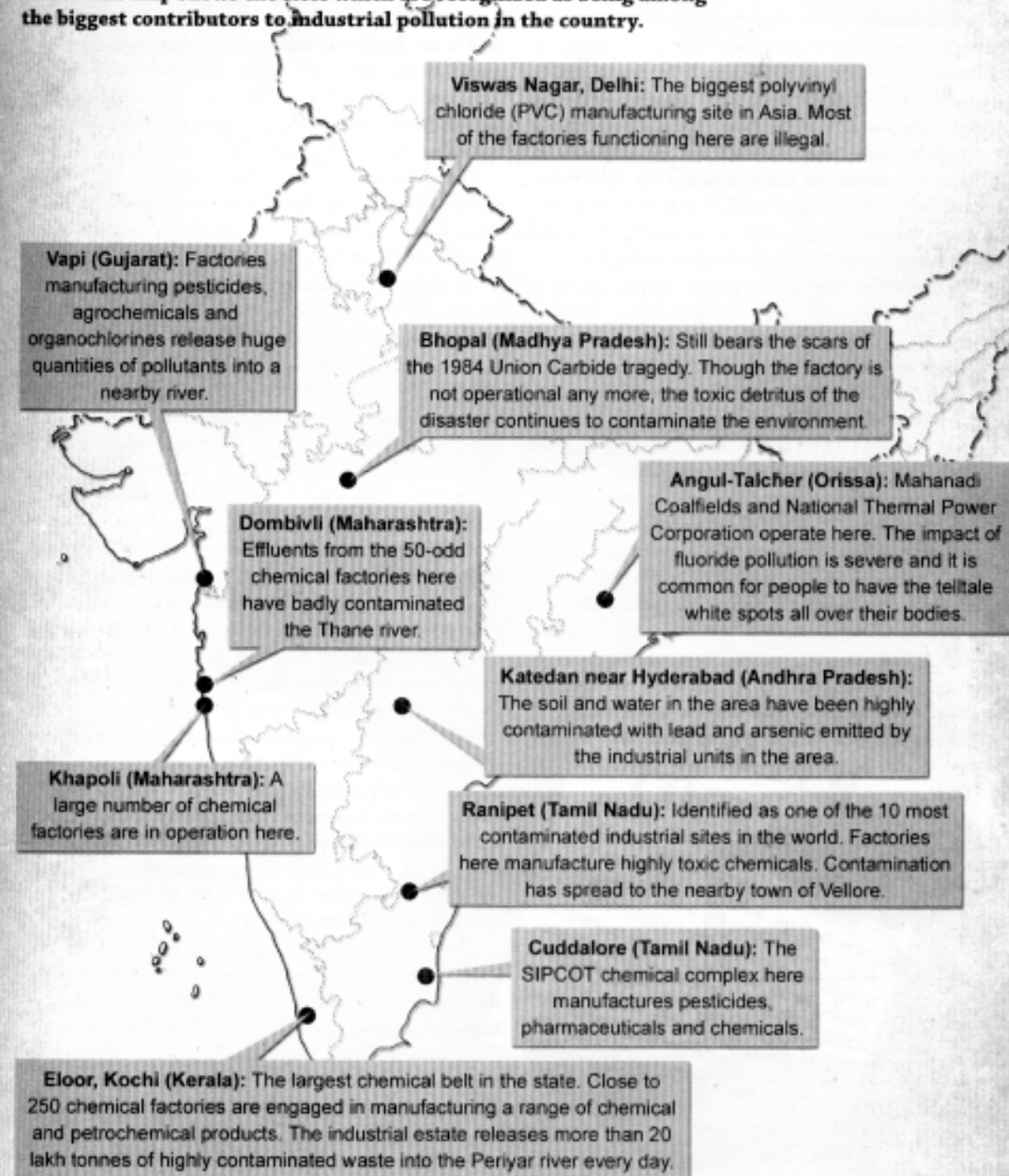






Hot spots map of India

India has been identified as one of the 10 most polluted nations in the world. This map shows the sites which are recognized as being among the biggest contributors to industrial pollution in the country.



Corporate social irresponsibility

In March 2001 Hindustan Lever Limited (HLL), one of Indian business's shining examples, was found to have dumped over 300 tonnes of mercury outside its thermometer plant at Kodaikanal in South India. HLL has for decades been the favorite domestic destination for the elite from India's prestigious business schools, and makes huge investments in providing challenging environments for its professional staff. Yet it fought tooth and nail to deny the mercury contamination, only to be finally chastised by the community and the government itself.

"Responsible Care", "Corporate Social Responsibility (CSR)" and the UN-promoted "Global Compact" are new terms that have found increasing international legitimacy in today's business. But are they real? As corporates become more global and enter newer developing country markets, such as in India and China, these terms are widely used on websites, in corporate literature and in presentations, evidently to convince people that things have changed and that a new ethical global business regime is in place. However, the nature of engagement on the ground leaves a lot to be desired.

In India, the market is the new mantra. Globalisation has brought in new players and alluring products. The growing middle class, which has been bereft of goods in the past, is too happy consuming, to want to pay heed to what may lie underneath.

For businesses, requirements such as "ethical behavior" can put an uncomfortable hurdle in that

path but, for a powerful corporate, bending the rules is not difficult. Corporate philanthropy helps as well. NGOs are funded to carry out "community development" work. Cynically, such donations also obtain local tax rebates. But even though some people may benefit from such charity, it does not translate into changing the way business itself is done.

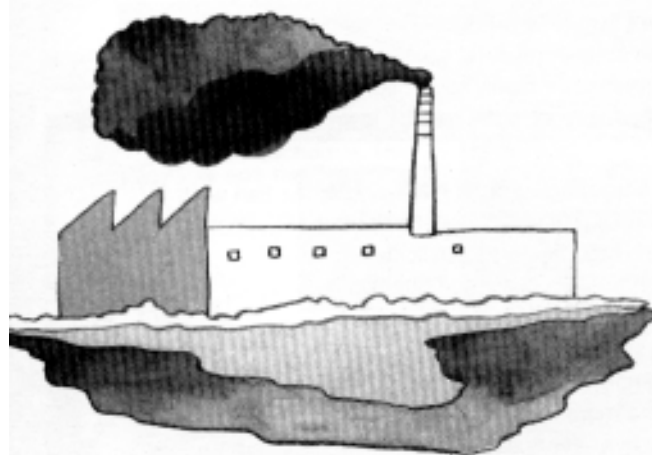
Can Corporate Social Responsibility truly be a reality in such a context? Or does it perhaps need other legal and institutional pushes which empower the citizenry to function adequately? Such provisions can include effective liability laws, information disclosure requirements, corporate accountability and an impartial implementation of various citizens' rights through various bodies.

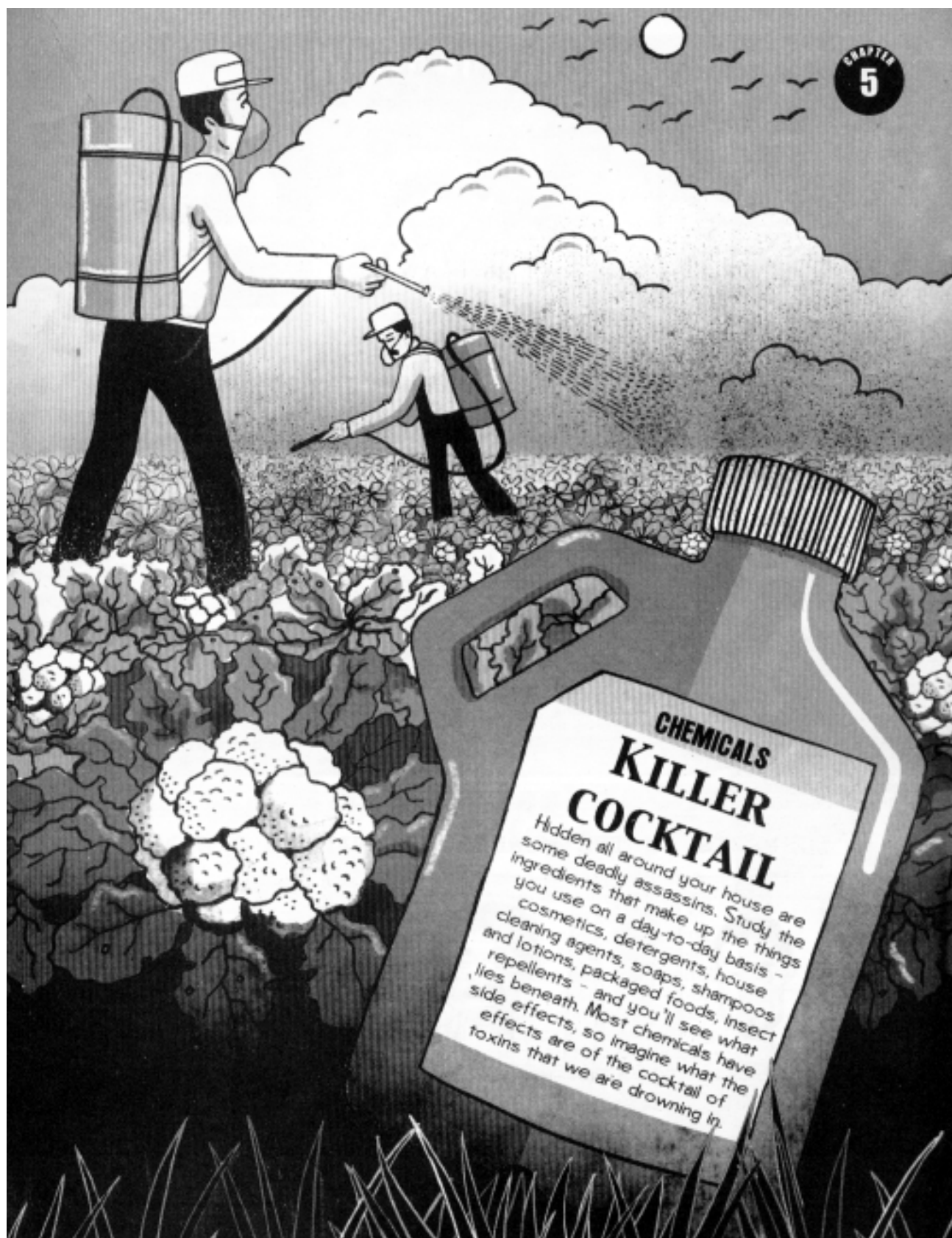
Take the case of producer responsibility for waste management. Many countries in Europe, including Switzerland, Sweden, Germany, etc., by law need companies to collect used cars, television sets, computers and batteries and to dispose of them. It is another matter that much of this is often collected and exported to the South! However these "responsible" models work in the given legal and social milieu. The same companies do not show such 'enlightened' behavior in India, and in fact often resist the setting up of such systems through their immense lobbying powers with governments. It would be futile to expect CSR to work in such an environment.

Of course the changing nature of business as it steps into new global forms can also be an opportunity for bringing in that level of accountability. Global brands are more vulnerable to public perceptions about their being "good" simply because much more is at stake, both in terms of money that is invested in building such brands, as well as in the markets which they affect.

CSR has a long way to travel. Today it operates in an environment that is unfavourably balanced for the consumer. Even though CSR relates to ethics in business, it is pushed by external pressures rather than from an internalised respect on the part of corporates for people, nature and the environment.

Extracted from "Corporate Social Responsibility: A Critical Perspective from India", Ravi Agarwal, November 2003; <http://www.toxicslink.org/art-view.php?id=99>

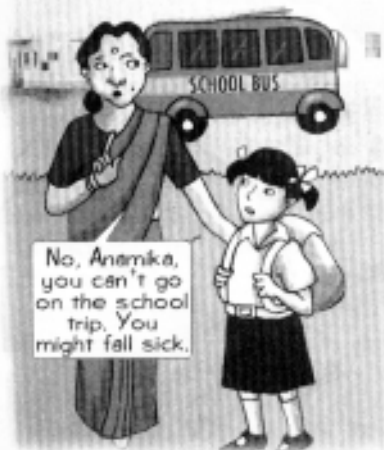




Anamika Sachdeva has always been something of a sickly child.



No, Anamika, you can't have that. You'll have a stomach upset tomorrow if you do.



No, Anamika, you can't go on the school trip. You might fall sick.

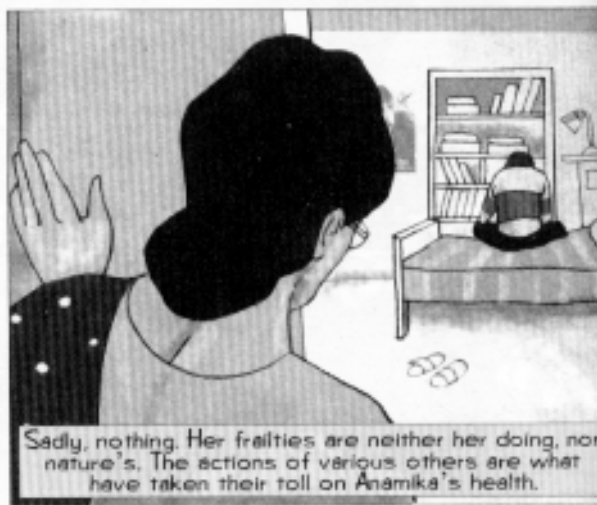


No, Anamika, you can't stay out late with your friends. You'll have a migraine attack tomorrow if you do.

Of late, the denials have begun to frustrate Anamika. She wishes she had someone to blame but herself.



Why do I always have to suffer? What have I done to deserve this?



Sadly, nothing. Her frailties are neither her doing, nor nature's. The actions of various others are what have taken their toll on Anamika's health.

If one were able to trace the threads of evidence back far enough, a gallery of suspects might appear.

SUSPECTS IN THE MURDER OF ANAMIKA'S HEALTH



Altaf Mohammed
Farmer



Lallan Bhai
Handyman



Bonnie
Doll

And though they may all be guilty of the crime, they were each innocent in its commission. Odd, but true.

A Whiff of Danger

The first assault on Anamika's well-being came even before she was born! For all that Altaf Mohammed knew, he was just trying to improve his yield.



The pests have really multiplied in the ground this year. I hope this Dieldrin spraying works.

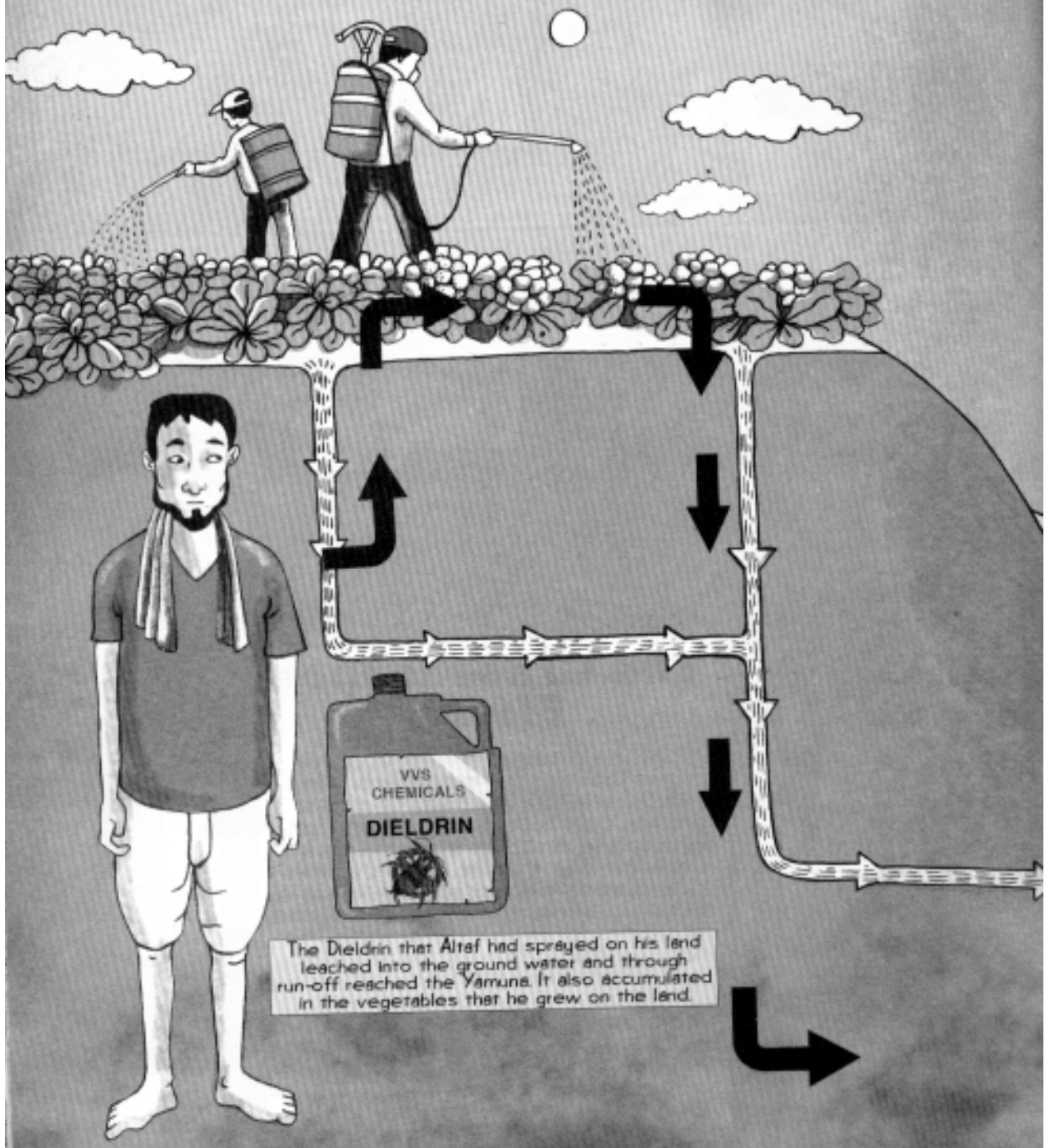
What Altaf didn't know — which would hurt Anamika as well as him — was that Dieldrin is one of the most dangerous chemicals in the world. Informally called the Dirty Dozen, these are a group called Persistent Organic Pollutants, or POPs for short. Some of these are used as fertilizers, some as industrial chemicals. And it's the persistence of these poisons that make them so dangerous.

One of the ways that the POPs propagate is through what's called the Grasshopper Effect.

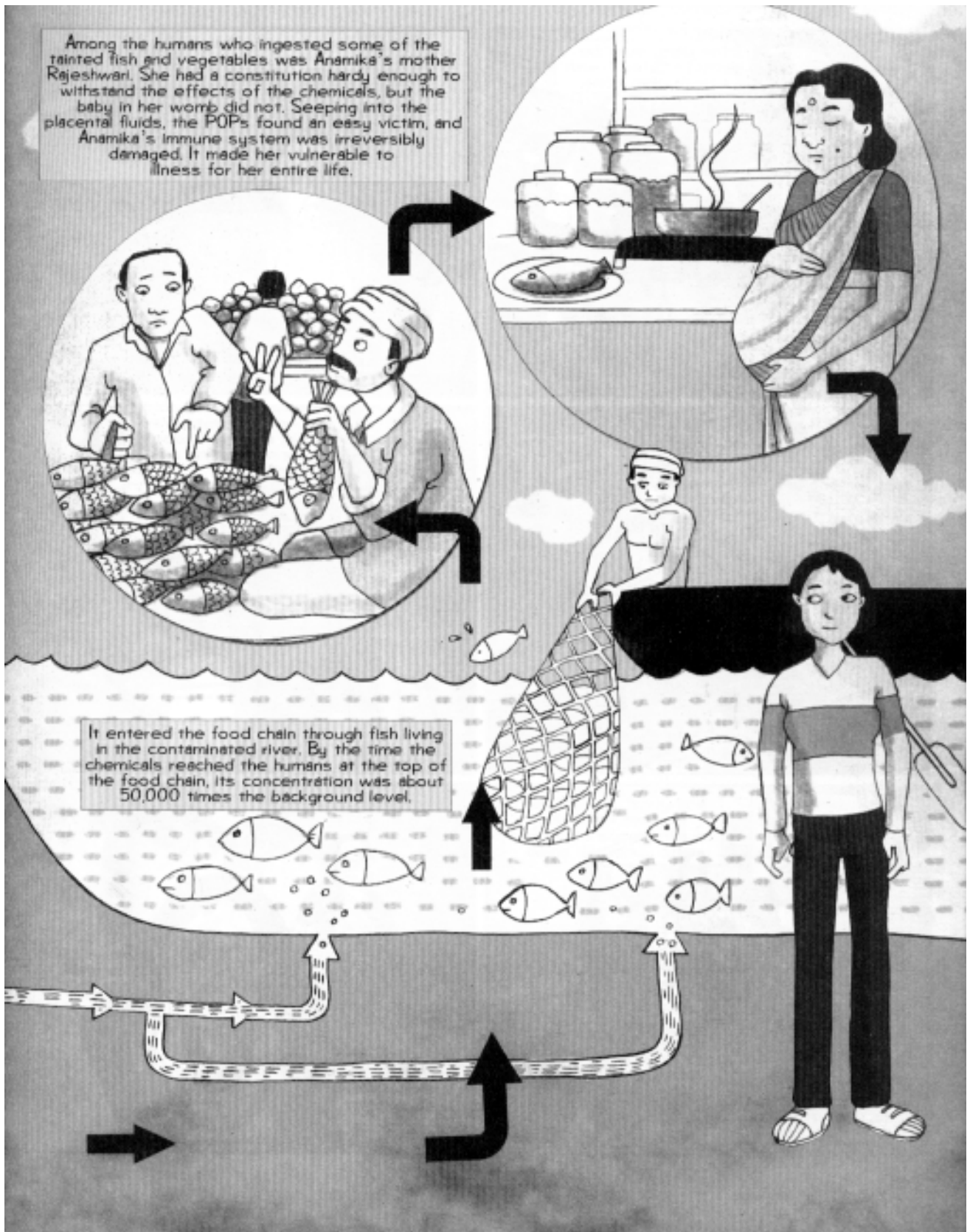
The Grasshopper Effect

POPs are circulated globally through a process known as the "grasshopper effect", which sees them hop from one point to another. Each hop has three stages: first, the pollutants evaporate from soils in warm areas like India; they are then transported by air currents as vapor around the globe; and finally they condense in colder regions where they fall as toxic rain or snow. This method of propagation and the persistence of these chemicals has led to a situation where traces of these toxins have even been found in the breast milk of Eskimo mothers, as far removed as possible from the "civilized world" which produces these chemicals.

However, it's the POPs' property of bio-accumulation that connected Anamika to Altaf.

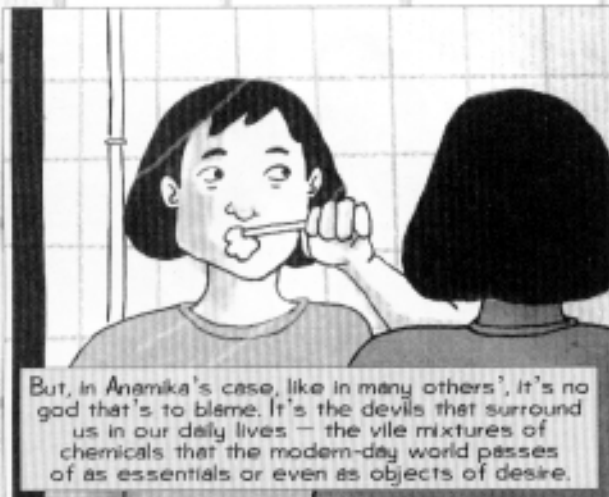


Among the humans who ingested some of the tainted fish and vegetables was Anamika's mother Rajeshwari. She had a constitution hardy enough to withstand the effects of the chemicals, but the baby in her womb did not. Seeping into the placental fluids, the POPs found an easy victim, and Anamika's immune system was irreversibly damaged. It made her vulnerable to illness for her entire life.









Cosmetics

Toothpaste, shower gel, soaps, shampoo and deodorant all help us maintain certain standards of personal hygiene, but how much do we know or even care about what goes into these products that we use lavishly on our bodies? Virtually all synthetic cosmetics, skin care and body care products have toxic chemical ingredients that may be damaging to health. While not all are harmful, too many of the toiletries and cosmetics we use are carcinogenic cocktails of hazardous substances.

Propylene glycol is a wetting agent and solvent used in make-up, hair-care products, deodorants and after-shave, but it is also the main ingredient in anti-freeze and brake fluid. Similarly, polyethylene glycol, a related agent found in most skin cleansers, is a caustic used to dissolve grease — the same substance found in oven cleaners. One of the worst offenders is sodium lauryl sulphate (SLS), which is commonly found in shampoos, conditioners, toothpaste and body washes — even the herbal, organic varieties. SLS is a harsh, caustic detergent used in industrial floor cleaners, engine degreasers and car wash. It can cause eye irritation, skin rashes, hair loss and mouth ulcers. When it is combined with other ingredients, it can form nitrosamines that are carcinogenic.

It has been estimated that around 85,000 chemicals are routinely used in everyday cosmetics — even those claiming to be herbal or natural.



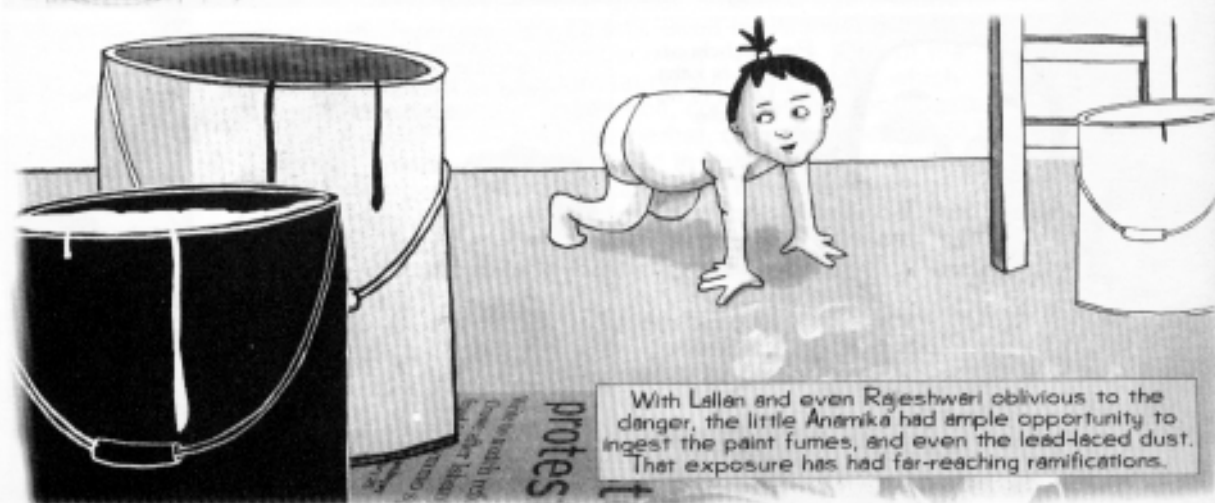
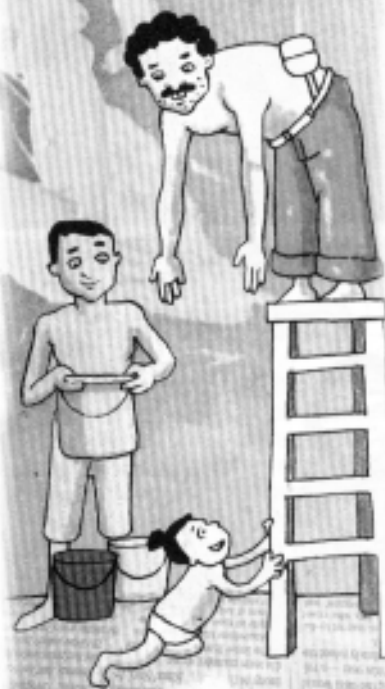


A Brush with Toxins

Fifteen years ago, Lallan had been assigned the task of re-painting the Sachdevas' house.

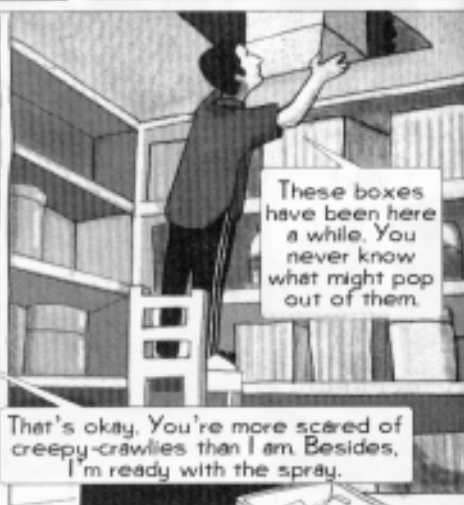
The paint he chose to use had some very desirable properties. It was bright, it dried fast, lasted long, remained fresher and resisted moisture.

But the key ingredient that made all this happen was lead. Lead, toxic for humans of all ages, but particularly dangerous in the case of children exposed to it.



With Lallan and even Rajeshwari oblivious to the danger, the little Anamika had ample opportunity to ingest the paint fumes, and even the lead-laced dust. That exposure has had far-reaching ramifications.





Millions of years of evolution and survival. No match for modern chemicals. How do we humans expect to remain immune to their effects?

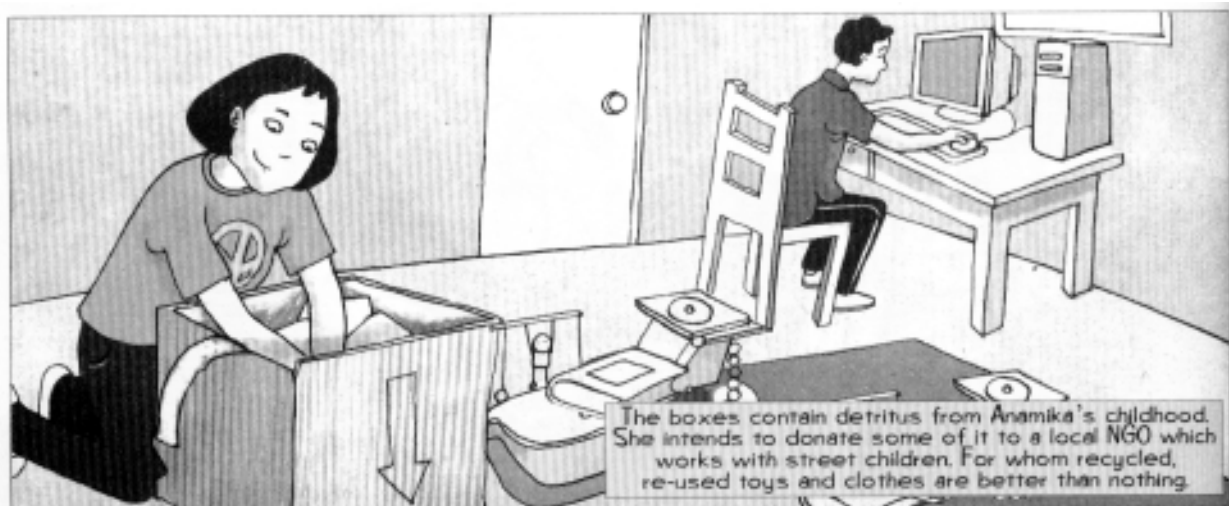
Insecticides

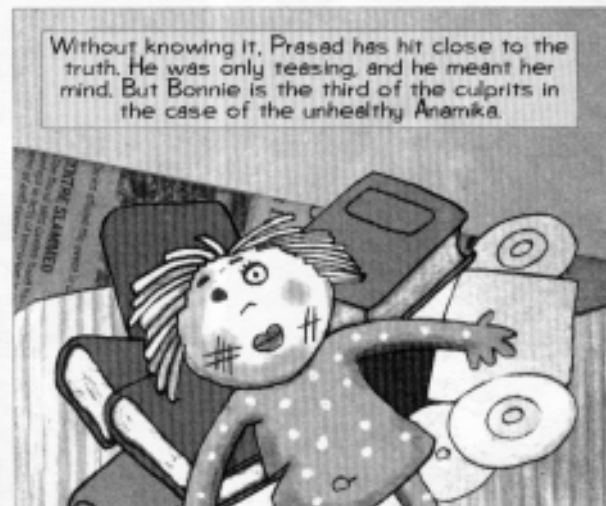
The use of insecticides in the home is a handy way of keeping at bay mosquitoes and other insects that spread deadly diseases. But the chemical-based products we use in our homes may be just as dangerous as the ones we come across outdoors. Powerful insect repellents are often used longer than the recommended period of time, a problem exacerbated by the fact that many residential homes are not adequately ventilated. According to a recent study, **children in the womb exposed to household insecticides have an increased risk of developing brain tumors later in life.**

Mosquito mats and coils

Commonly used coils and mats contain the insecticide allethrin. Allethrin is effective because it targets an enzyme called cholinesterase, which aids oxygen absorption in the body of the mosquito. However, its use needs to be controlled as it is fat-soluble and can have an adverse effect among humans if used in excess. Long-term exposure to allethrin can disrupt the function of enzymes in humans and can cause dizziness, nausea and eye or nose irritation.

Organic alternatives to most household insecticides do exist, but are currently not widely marketed. Consumer pressure could change this.





Killing Me Softly

Bonnie used to be Anamika's constant companion and close confidante. She knew all of Anamika's little secrets.



These are no harmless child-friendly chemicals. They are linked directly to kidney damage and cancer, and may interfere with the reproductive system.





Persistent Organic Pollutants

Persistent Organic Pollutants, or POPs, are a group of chemical compounds that are released into the environment predominantly by human activities such as house building and spraying crops with pesticides. They are among the most dangerous pollutants because they are long-lasting, undetectable and yet ubiquitous.

Some POPs are produced for use in pesticides, some for use as industrial chemicals and others as unwanted by-products of combustion or other chemical processes that take place in the presence of chlorine compounds. Today, they are widely present as contaminants in food and the environment in all regions of the world. Humans everywhere carry a POPs body burden that contributes to disease and health problems.

Research has shown that exposure to POPs can lead to cancer, damage to the nervous system, diseases of the immune system, reproductive disorders and can interfere with child development.

The danger posed by POPs has been internationally recognized. In 2001, representatives from 151 countries came together in Stockholm to sign a legally binding treaty banning the use of 12 of the most harmful POPs known as the "dirty dozen."



What you can do

While it is difficult to avoid POPs altogether, steps can be taken to minimize individual exposure to the chemicals.

- Eat food from lower down the food chain and avoid fats.
- Choose unbleached paper products.
- Avoid PVC plastics.
- Use weed killers that do not contain POPs or dioxins.

Poisonous paints

The greatest danger to health and the environment when it comes to paint is from lead. Although lead-based paints have been banned in developed countries for decades, they continue to dominate the market in India and Asia, with little consumer awareness about its toxic effects. Leaded paints account for 91 percent of the Indian market.

Although lead improves the performance of paint, it is highly toxic to humans. It is particularly dangerous to children under the age of six, whose bodies are still developing and to unborn fetuses, as it is more easily absorbed into growing bodies and tissues. Tests have revealed that over 51 percent of children below the age of 12, living in major urban areas of India, have elevated levels of lead in their blood.

Lead causes damage to the nervous system, hearing loss, stunted growth, reduced IQ and delayed development. It can cause kidney damage as well as reproductive problems in adult men.

Stringent rules and regulations exist internationally on the use of lead in paints, but in India there are few specific rules and those that do exist are loose in their interpretation and implementation. In 1995, the MoEF laid down a set of standards for paints and powder coatings to meet the Ecomark criteria, stating that the product must display a list of ingredients and it should not contain pigments of lead. The standards, however, are not mandatory.

What you can do

As there is no consumer demand for lead-free paints, leaded products continue to dominate the market. Consumers need to be aware of the toxic effect of the paints they use to decorate their homes, and the consequences of this impact on the environment and on the health of those who are regularly exposed to the paints.

- Support campaigns calling for the Ecomark standards to be made mandatory and for lead-pigmented paints to be outlawed for use on children's toys.
- Select lead-free paints for use at home.

Cosmetics: What you can do



There is no need to splash out on expensive and potentially harmful beauty products when the full range can be made for a fraction of the price at home. Everyday natural ingredients found in most household cupboards and kitchens form the basis of natural beauty products that can be prepared at home.

Recipes

Cleanser: Grind some barley and mix it with two teaspoons of lemon or lime juice and a little fresh milk and use as a face-mask. In addition to giving your face a deep cleanse, this mixture can also help improve blood circulation.

Moisturizer: Use one peach, four grapes and a few cabbage leaves to make a paste. Smear over the face and leave for 15 minutes before washing off.

Wrinkle chaser: Beat an egg white together with a few drops of lemon or lime juice. Apply to the face and neck, allow the mixture to dry thoroughly before rinsing off.

Bright eyes: Cut a fresh cucumber into rings and place over eyes. Lie down and leave in place for around 15 minutes.

Chapstick: To prevent your lips from chapping, use hot water fermentation on your lips and then apply a mixture of vaseline and honey.

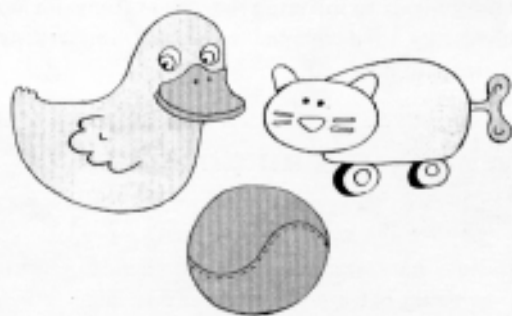
Toxic toys

Babies and toddlers love to put things in their mouths, especially when they are teething. It is a way of exploring the world and getting to know the things that surround them. But sucking on certain plastic toys can be poisonous.

Many toys are made of polyvinyl chloride (PVC), especially soft toys and teethingers. A Greenpeace International study revealed that toys made of soft PVC plastic contain dangerous additives such as phthalates, lead and cadmium, which can leak out of plastic and be ingested by children chewing on them. Soft toys, mostly made of PVC, account for 35 percent of India's toy market.

Since 1997, many countries have banned the use of these chemicals in toys. In India, however, neither manufactured nor imported toys are monitored for toxicity by any government agency. The Bureau of Indian Standards (BIS) does set safety standards for toys, but there is little enforcement.

A recent survey by Toxics Link found toys collected from three of India's major cities — Delhi, Mumbai and Chennai — contained a high percentage of lead and cadmium, which are both known to seriously damage health. Tests were carried out on 111 toy samples. Of those, 77 were found to be made from PVC. A further 88 samples were analyzed for lead and cadmium. Both metals were found in all tested samples in varying concentrations.



What you can do

- Put pressure on the government to make safety standards compulsory in order to force toy manufacturers to adhere to them.



Assault from batteries

Batteries form another class of household items whose chemical components make them a cause for concern. But with batteries, the problem is not so much in their usage but in their disposal. With almost 2 to 3 billion batteries sold in India each year, it's a monumental waste problem.

Due to the presence of various heavy metals, batteries fall under the category of hazardous waste. Developed countries dispose of batteries in special sealed landfills meant for hazardous waste. India has no such measures for safe disposal of batteries, which end up in dump yards that are not equipped to contain harmful leachates. As a result, heavy metals leach into groundwater or end up in the air when hazardous waste is burned.

Recycling batteries is one way of minimizing the generation of heavy metal waste. The Indian battery industry needs to initiate recovery systems for used batteries as in developed countries and research safer ways of disposal.

What you can do

- Check to make sure you do not already have batteries in stock before buying more.
- Buy hand-operated goods that function without batteries, whenever possible.
- Look for batteries that have lower quantities of mercury and heavy metals.
- Consider buying rechargeable batteries. Although they also contain heavy metals like nickel and cadmium, they have a longer lifespan.

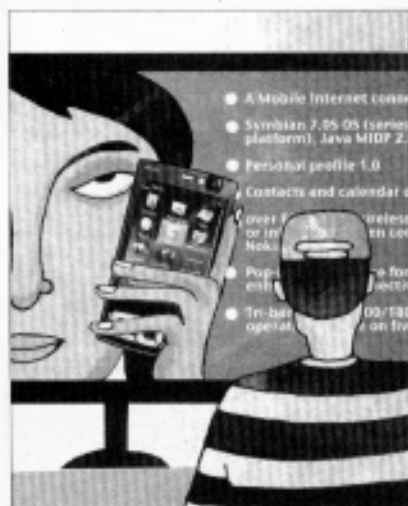
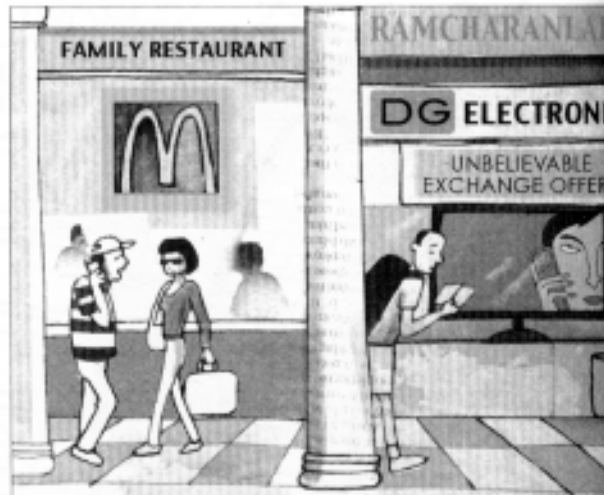
A lack of standards

A critical issue with regard to chemicals in our lives is the lack in India of health and safety standards for specific chemicals. Without benchmarks to compare against, individuals or organizations that want to take action against the illegal use of chemicals run up against a legal brick wall. A case in point was the issue of pesticides in aerated drinks such as Coca-Cola and Pepsi. While scientific studies proved conclusively that bottled drinks (and even mineral water marketed by these companies) contained levels of pesticides, there were no standards that specified what levels are unsafe, so no official action could be taken against the companies in question. For effective regulation of chemicals that invade our beings and our environment, it is vital for legislation to be enacted specifying, on the basis of reliable scientific research, mandatory standards for every category of item that is potentially hazardous.



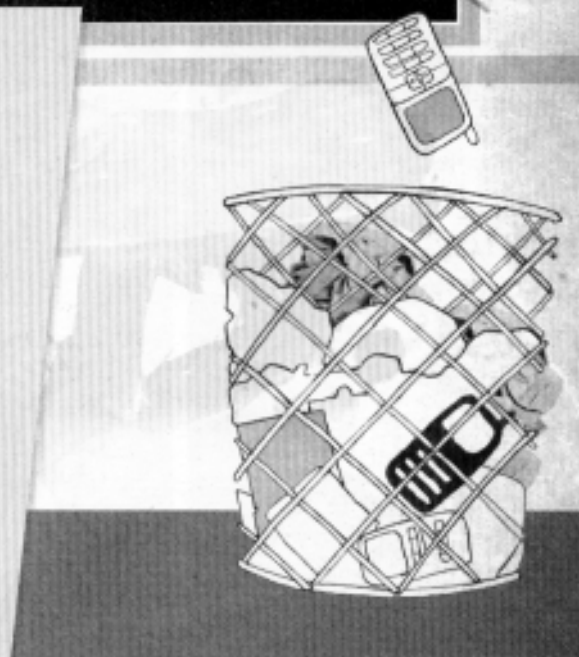
ELECTRONIC WASTE SYSTEM FAILURE IMMINENT

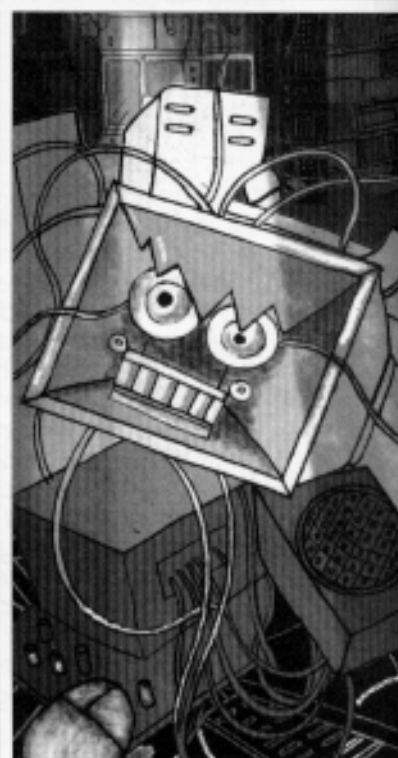
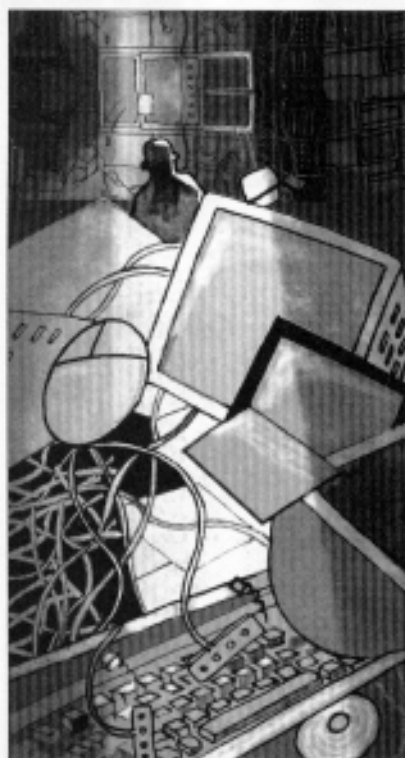
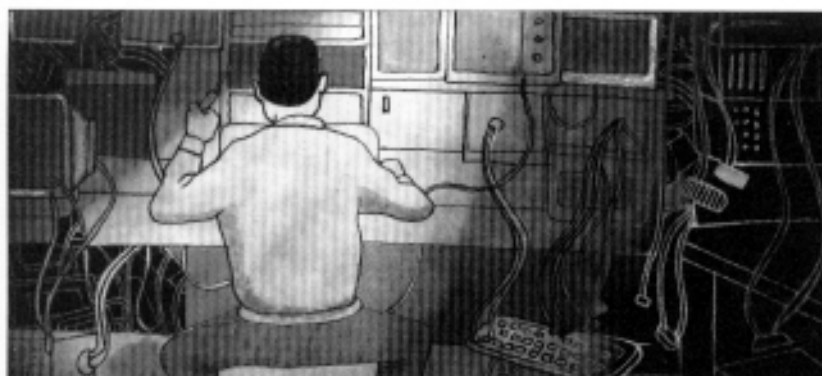
While the age of information has brought with it many benefits, it has also resulted in a whole new category of dumped material — electronic waste. The extent of the burgeoning problem is only now coming to light. One of the ways to deal with it is to make manufacturers responsible for the entire lifecycle of their products, including after they are dumped by the consumer.

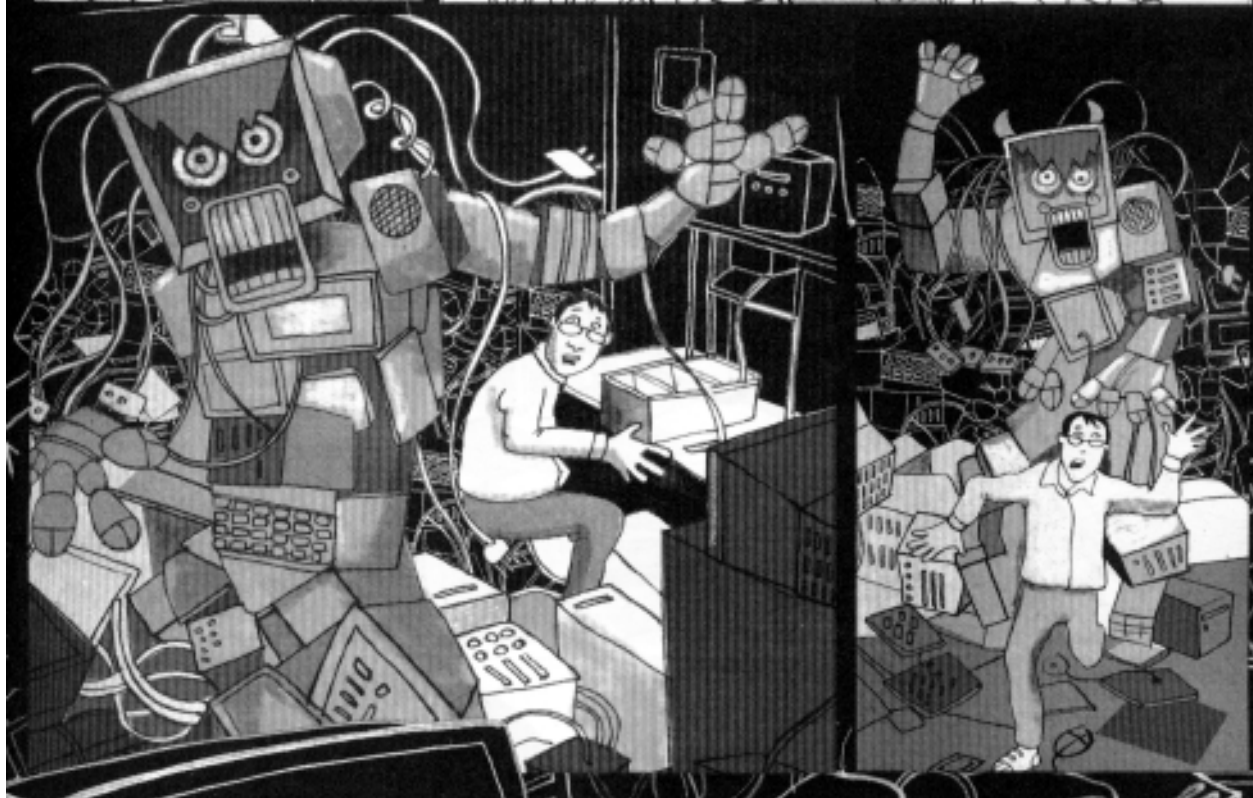
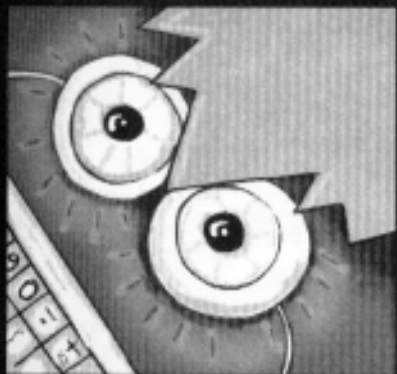




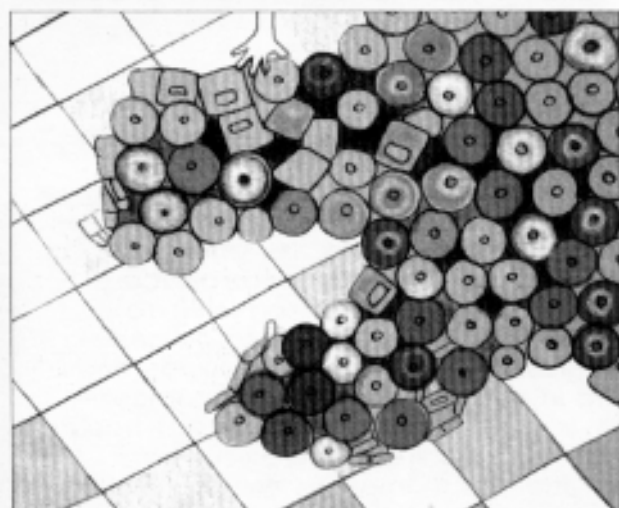
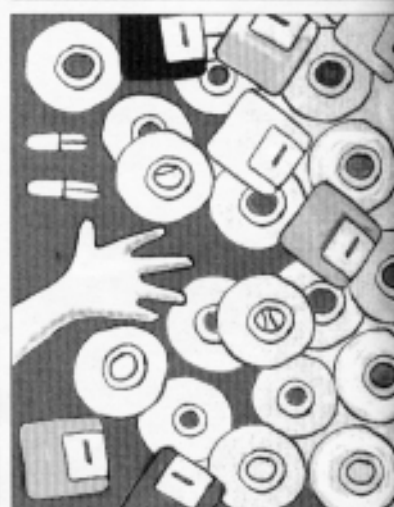
While technology has transformed the way we live, work and communicate, its impact on the market makes products obsolete at a rapid rate. Our world is beginning to generate a stockpile of discarded electronic goods that have come to the end of their useful life. This includes products from cellphones and music players through personal computers to household appliances like TVs, refrigerators and washing machines. In the junkyards of our cities, electronic waste, also known as Waste from Electronic and Electrical Equipment (WEEE) or e-waste, is beginning to grow into a mountain of threatening proportions.

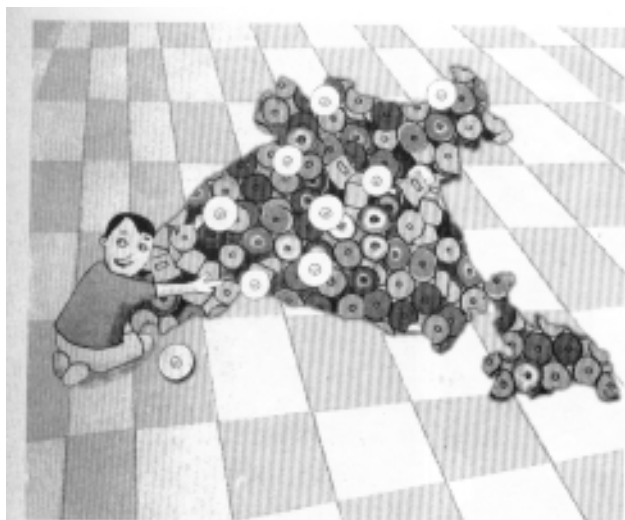




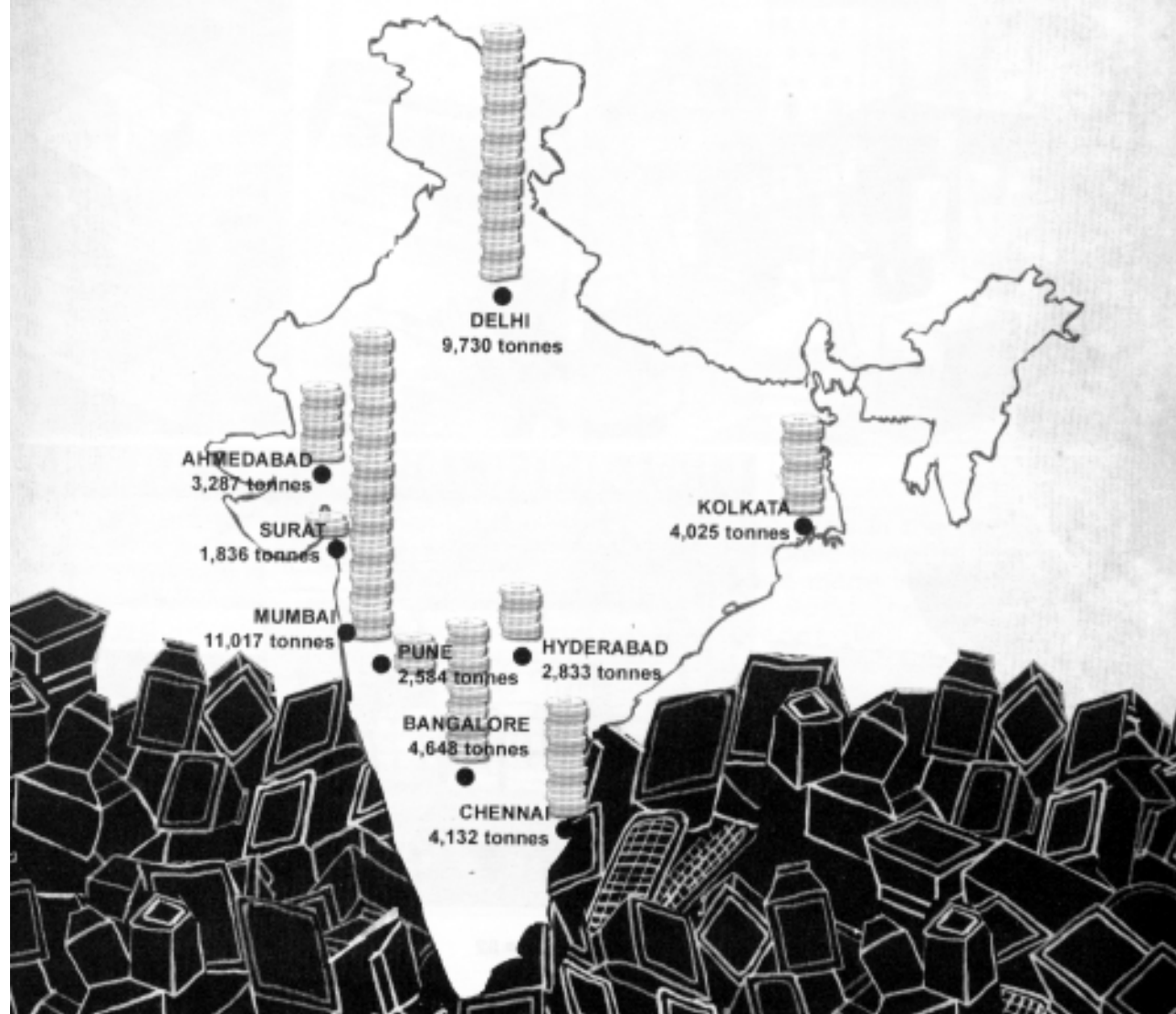


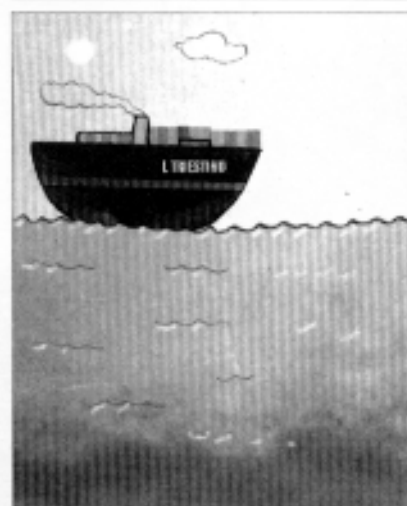
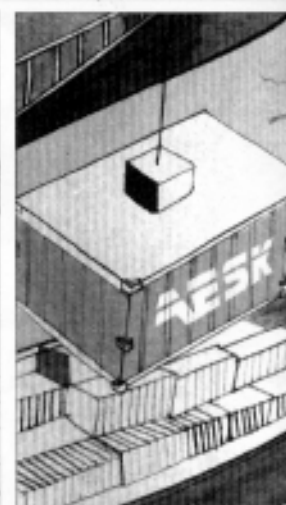
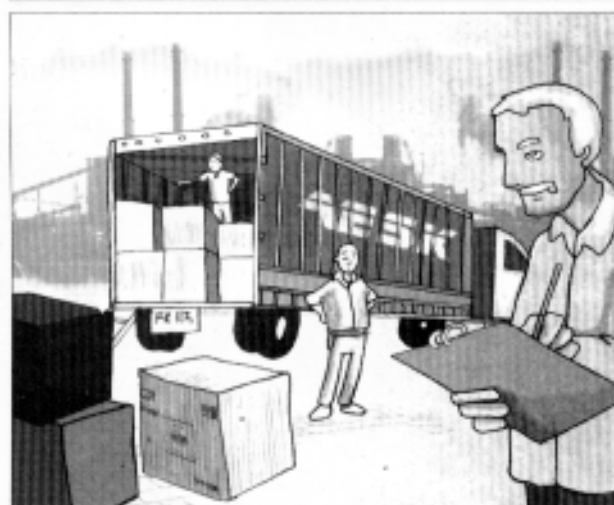
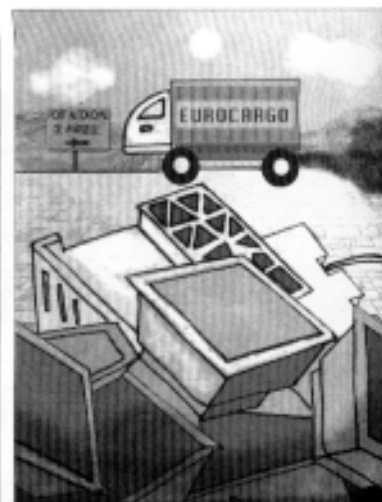
Computers and computer peripherals constitute a large proportion of the total e-waste. They also pose the most dangerous threat to health and the environment. More than 1,000 materials are used to produce a computer – and about 50 of these are highly toxic. Chlorinated and brominated substances, toxic gases, toxic metals, biologically active materials, acids and plastics are all used in the production of a computer. While the computer is in use, there is no direct health impact. But when it is junked, however, the environmental cost and health impacts are significant.





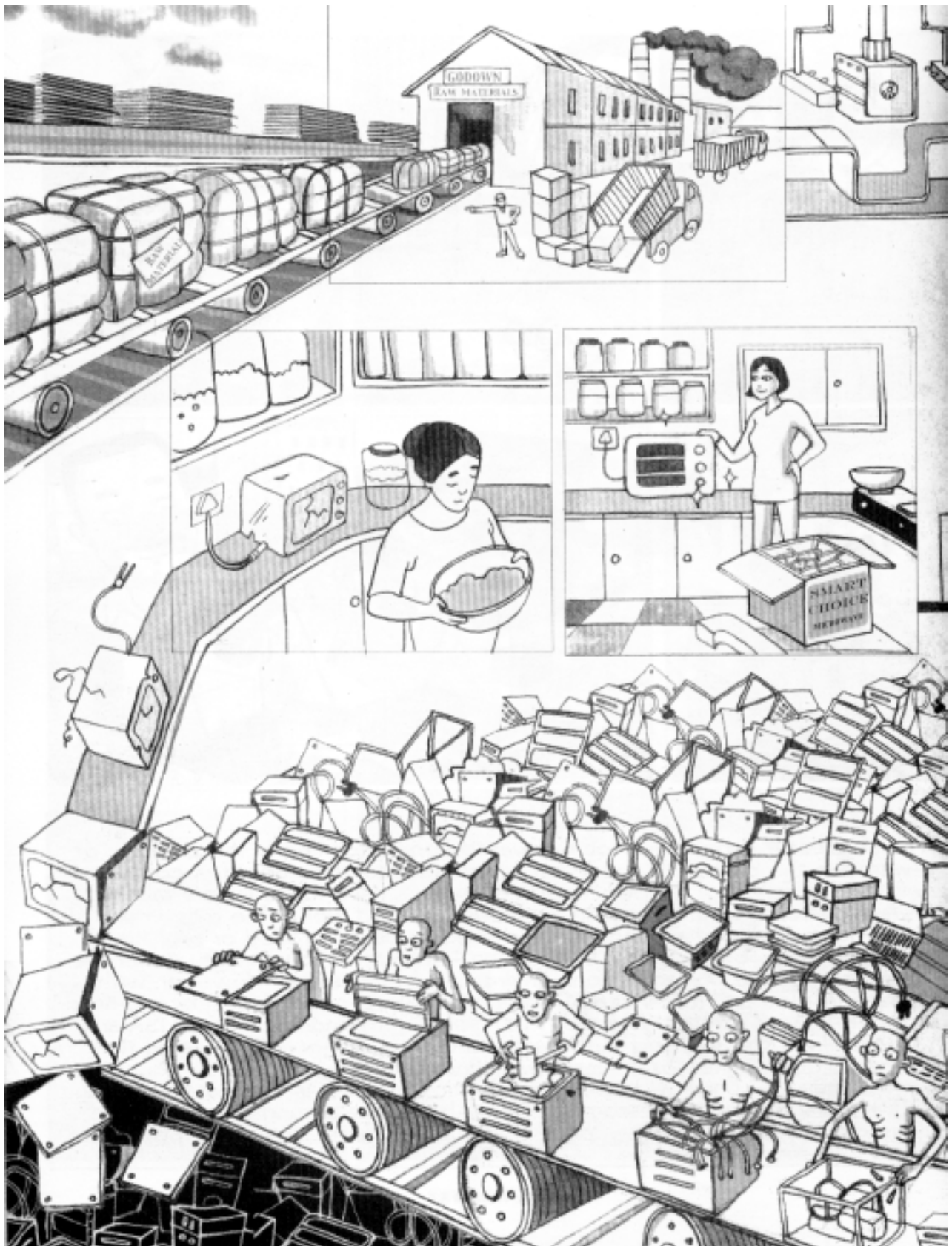
The problem in India is that there is little recognition of the extent of the country's e-waste problem, and very low awareness of its damaging effects. A preliminary study on e-waste generation in 12 Indian cities carried out on behalf of the German NGO, GTZ, found that Mumbai is India's chief e-waste producer, followed by Delhi and Bangalore.

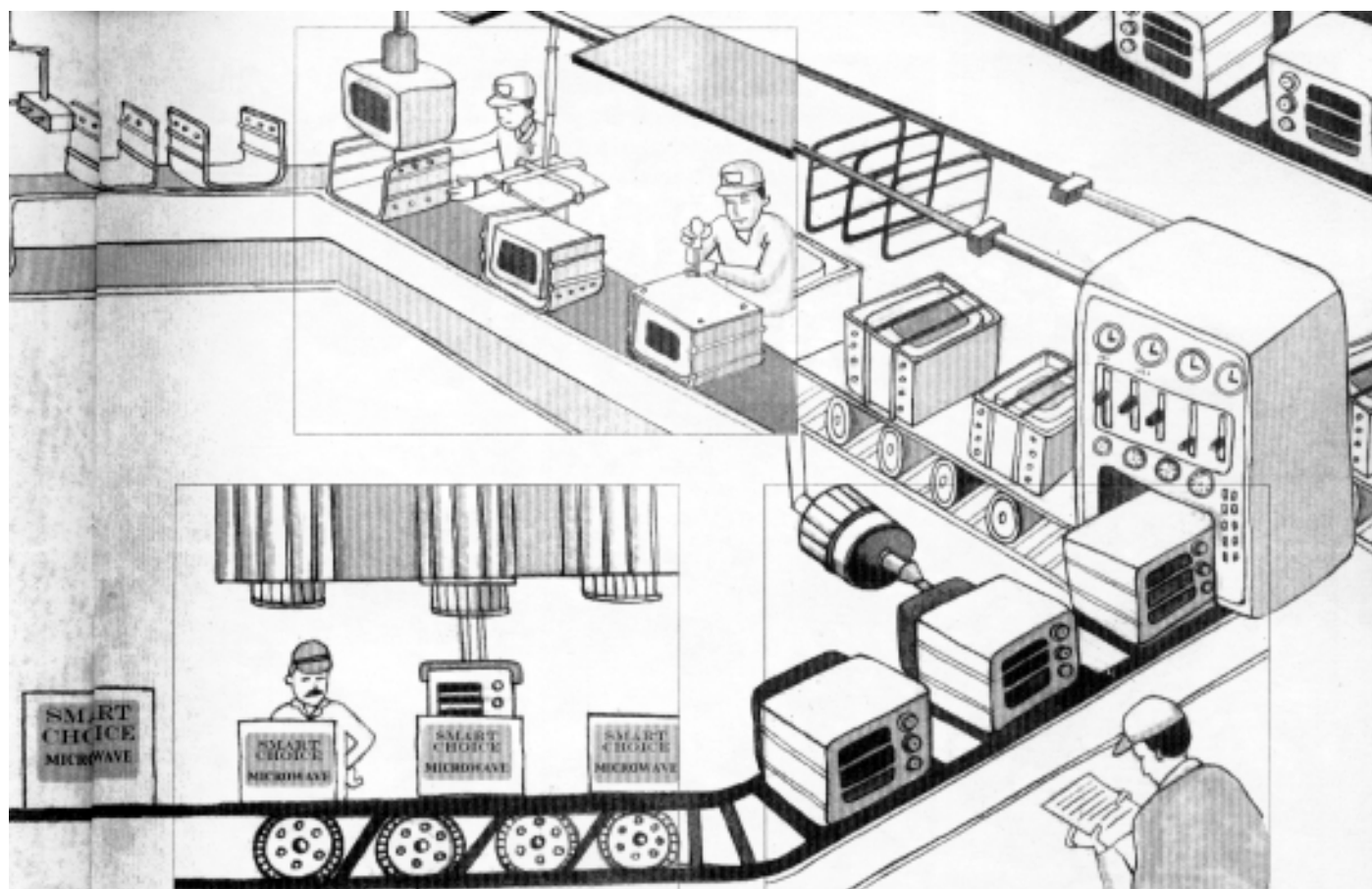




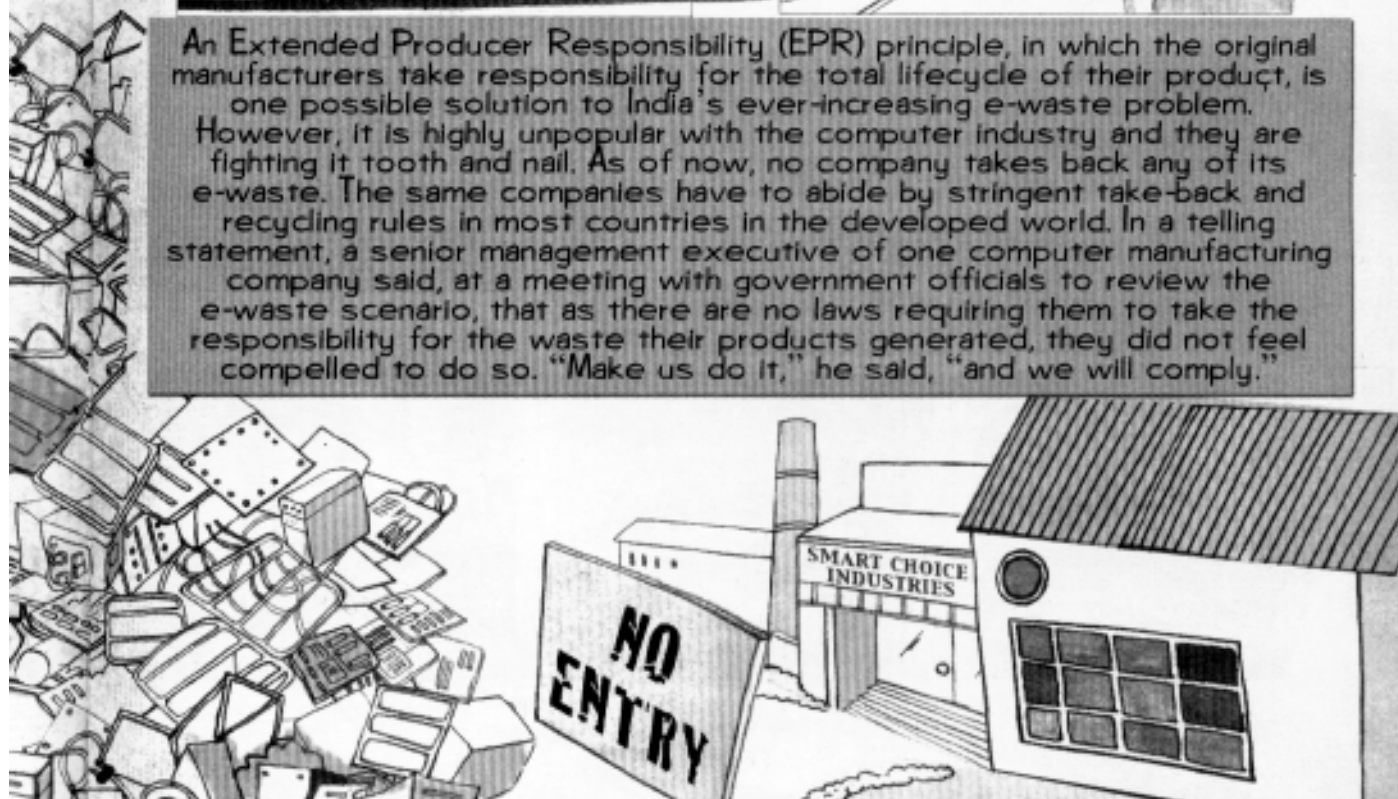


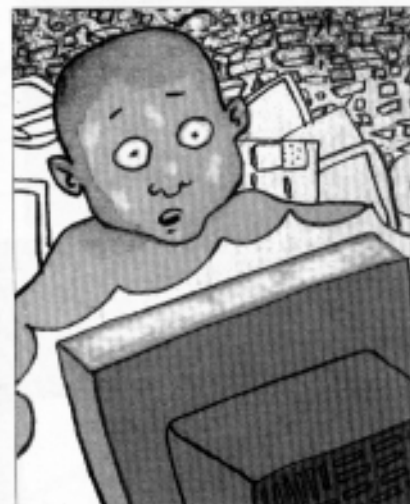
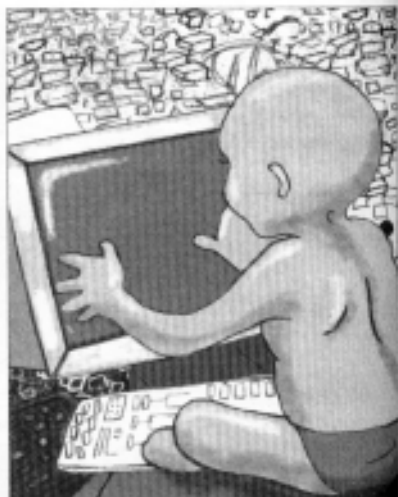
A much greater danger than local e-waste generation lies in the dumping of e-waste in the country by western countries. Economic benefits combined with the absence of proper import regulations have made India a favored destination for e-waste dumping by the developed world. The movement of hazardous waste of all kinds is supposed to be controlled or prohibited under the terms of the Basel Convention – an international treaty under the auspices of the United Nations Environment Programme. However, with e-waste labeled as “metal scrap” and end-of-life products as “second-hand goods”, huge quantities find their way illegally into India from the USA and Europe. In 2004, a report by Britain’s Environment Agency revealed that around 23,000 tonnes of e-waste was finding its way annually to countries such as India and China without proper authorization. It is estimated that, by 2010, more than 1.3 billion computers will be in use around the world, and most of these will be shipped to Africa, India and China for disposal.





An Extended Producer Responsibility (EPR) principle, in which the original manufacturers take responsibility for the total lifecycle of their product, is one possible solution to India's ever-increasing e-waste problem. However, it is highly unpopular with the computer industry and they are fighting it tooth and nail. As of now, no company takes back any of its e-waste. The same companies have to abide by stringent take-back and recycling rules in most countries in the developed world. In a telling statement, a senior management executive of one computer manufacturing company said, at a meeting with government officials to review the e-waste scenario, that as there are no laws requiring them to take the responsibility for the waste their products generated, they did not feel compelled to do so. "Make us do it," he said, "and we will comply."







GAME OVER!!



India generates around 150,000 tonnes of WEEE annually, and most of this ends up in an informal but well-established recycling system that exists in the absence of health and safety rules. Untrained, usually unprotected casual laborers set about breaking down the e-waste into its component parts with the aim of reclaiming some of those materials for re-sale. It is at this stage that e-waste has its greatest environmental impact and poses the greatest danger to human health. Toxic chemicals are released into the ground, air and water, causing widespread pollution and chemical contamination. The vast majority of those working in the unofficial recycling sector are the vulnerable urban poor, including many women and children. In Delhi alone, more than 10,000 people are directly employed in recycling activities, not counting those who collect the waste.

What makes electronic waste toxic?

Electronic goods, especially computers, contain a cocktail of some of the most toxic substances known to man. These toxic compounds are released as the computer or other appliance is broken down.

Lead: Lead is a well-known potent neurotoxin. It is released when the glass of a computer or television screen is smashed. It accumulates in soft tissue and bone over time and can cause damage to the central and peripheral nervous systems and kidneys. It is especially dangerous for children and can cause blood and brain disorders. Consumer electronics account for 40 percent of the lead found in landfills. This has the potential to leach into the ground and contaminate drinking water supplies.

Cadmium: Cadmium is known to cause cancer. Compounds containing cadmium are found inside computers and televisions. Cadmium compounds can irreversibly damage human health and accumulate in the body particularly the kidneys.

Mercury: Mercury, like lead, is a neurotoxin, and elevated blood mercury levels lead to retardation and deformities in children. It is used in switches and batteries in electronic and electrical appliances. When inorganic mercury seeps into water, it is transformed into methyl mercury. This easily accumulates in living organisms and grows in concentration as it moves up the food chain, usually via fish. It is estimated that 22 percent of the world's consumption of mercury is used in electrical and electronic equipment.

PVC: According to the Microelectronics and Computer Technology Corporation in the USA, more than a quarter (26 percent) of the 580,000 tonnes of electronics plastic scrapped each year is PVC. PVC, one of the most environmentally-hazardous types of plastic, has mainly been used in cabling and computer housings. The production and burning of PVC generates dioxins and furans, which are among the deadliest substances known to man. As a result, many computer manufacturers have begun to reduce or phase out the use of PVC.

Brominated Flame Retardants (BFRs): BFRs are a group of brominated chemicals commonly used in electronic products as a means of reducing flammability. In computers, they are used in four main



applications: in printed circuit boards, in components such as connectors, in plastic covers and in cables. They are also used in the plastic covers of television sets and in domestic kitchen appliances. Among the most dangerous BFRs are polybrominated diphenyl ether (PBDE) and polybrominated biphenyls (PBBs). Researchers in the US found that exposure to PBBs may increase the risk of cancer of the digestive and lymph systems. They have also been linked to nausea, abdominal pain, loss of appetite, joint pain and lethargy. Due to the possible environmental hazards, PBBs were listed as one of six controlled substances under the Restriction of Hazardous Substances (ROHS) Directive, which was incorporated into European law in 2003.

What you can do

- Use electronic and electrical goods for a longer time.
- Return electrical goods to the manufacturer.
- Campaign for a better e-waste policy.
- Pass electrical goods on to friends instead of dumping them.

PLASTICS MATERIAL MAYHEM

The plastic bag has become a symbol of our society's callousness to nature. By now, there are few people left who are unaware of the extent of the damage that this little item of daily usage causes to nature, to other creatures, to our cities and to our own lives. Yet, so few take the simple steps required to deal with this menace.



The background of the page is a collage. On the left, there is a crumpled white plastic bag. On the right, there is a large, complex molecular model. This model consists of numerous dark grey spheres (representing carbon atoms) connected by thin lines (representing chemical bonds). These carbon atoms are further connected to many smaller white spheres (representing hydrogen atoms). The overall shape of the molecule is irregular and sprawling, resembling a branched polymer chain. The text is overlaid on this background.

PLASTIC HAS COME TO DOMINATE OUR LIVES SINCE IT WAS FIRST
CREATED MORE THAN 100 YEARS AGO. WE USE IT IN NEARLY
EVERYTHING WE DO, FROM FIRST THING IN THE MORNING WHEN
WE BRUSH OUR TEETH TO THE MOMENT WE SWITCH OFF OUR
LIGHTS AT NIGHT. THE "WONDER" MATERIAL HAS PROVEN SO USEFUL,
ADAPTABLE AND CHEAP TO PRODUCE, IT HAS LARGELY REPLACED
MORE TRADITIONAL SUBSTANCES LIKE JUTE, COTTON, WOOD,
PAPER, CARDBOARD, RUBBER AND GLASS. THERE IS
SO MUCH PLASTIC IN CIRCULATION TODAY THAT IT POSES
A MOST SERIOUS THREAT TO THE ENVIRONMENT.

PLASTIC IS MADE OF LONG CHAINS OF
CHEMICAL COMPOUNDS CALLED POLYMERS.
THEY ARE COMPOUNDS OF CARBON
SYNTHESIZED FROM PETROLEUM AND
NATURAL GASES WITH ONE OR MORE OF
THE ELEMENTS HYDROGEN, CHLORINE,
OXYGEN, NITROGEN OR FLUORINE.
PLASTICS DO NOT EASILY DEGRADE AND
PERSIST IN THE ENVIRONMENT FOR LONG
PERIODS OF TIME, SLOWLY RELEASING THE
CHEMICALS THEY ARE MADE FROM INTO
THE SURROUNDING AIR, WATER AND SOIL.

PLASTIC WASTE ACCOUNTS FOR AROUND 4 PERCENT OF INDIA'S MUNICIPAL WASTE.

*FOR A CITY LIKE DELHI, THAT MEANS MORE THAN 250 TONNES
OR 60 TRUCKLOADS PER DAY.*

AROUND 15 PERCENT OF INDIA'S TOTAL PLASTIC CONSUMPTION IS USED FOR PACKAGING.

*PLASTIC PACKAGING IS PRACTICALLY USELESS AFTER THE PRODUCT HAS BEEN
CONSUMED AND THE ONLY THING THAT CAN BE USEFULLY DONE
WITH IT IS TO RECYCLE IT.*

*DUE TO THE LACK OF AN EPR POLICY IN INDIA, MUCH OF THAT PLASTIC PACKAGING
ENDS UP CLOGGING DRAINS, RIVERS AND LAND, CHOKING WILDLIFE
AND THE NATURAL ENVIRONMENT.*

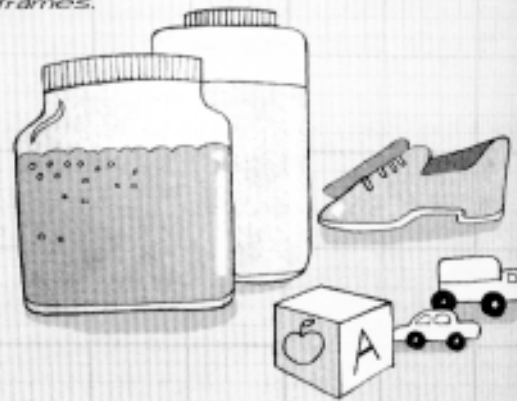
*RECENT TECHNOLOGICAL DEVELOPMENTS HAVE DIVERTED A LARGE
PART OF THE PLASTIC WASTE TO THE RECYCLING INDUSTRY. IT IS
IMPORTANT TO RECYCLE DIFFERENT KINDS OF PLASTICS
SEPARATELY SINCE THEY ALL HAVE DIFFERENT PROCESSING
TEMPERATURES AND ARE OFTEN INCOMPATIBLE WITH EACH
OTHER. HOWEVER, DUE TO A LACK OF PRODUCT LABELING
IN INDIA, IT IS VERY DIFFICULT TO DIFFERENTIATE
BETWEEN THE VARIOUS TYPES OF PLASTIC
RUBBISH PRODUCED IN TOWNS AND CITIES
CONTAINS A MIX OF PLASTICS THAT ARE
OFTEN BURNT AT MAKESHIFT DUMPS
OR ROADSIDES RELEASING
DANGEROUS CHEMICALS.*



DIFFERENT TYPES OF PLASTICS AND THEIR USES

Polyvinyl Chloride (PVC): Some of the most problematic types of plastic are chlorinated. A commonly used chlorinated plastic is polyvinyl chloride or PVC, which is used in a wide variety of everyday items from children's toys to food containers. PVC is the largest selling plastic in India accounting for 28 percent of the market. It is commonly used in carry bags, shoe soles and sheets. It is fast replacing wood for making window and door frames.

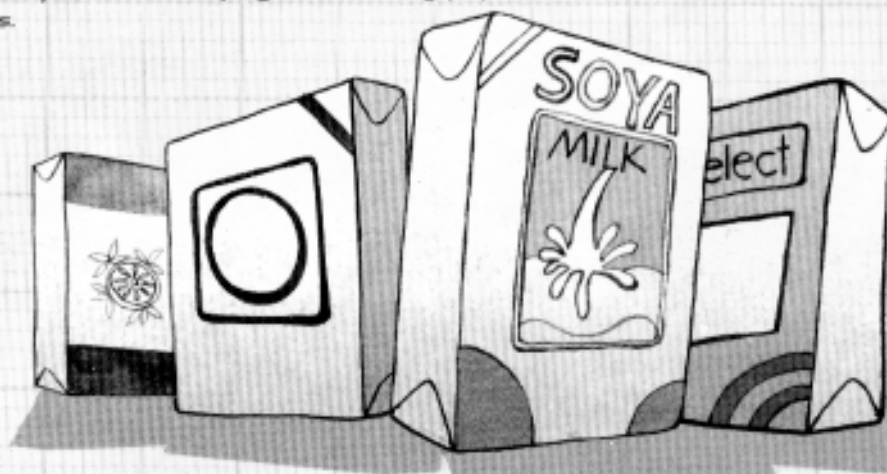
PVC's toxicity begins at the manufacturing stage and persists throughout its existence. First, the making of PVC powder involves the transport of dangerous explosive materials. Secondly, raw PVC by itself is not of much use. It needs the addition of toxic chemicals such as phthalates to make it soft and malleable, and heavy metals like lead and cadmium to give it a hard texture and an attractive color. These additives are dangerous toxins, which leach into the environment over a period of time.



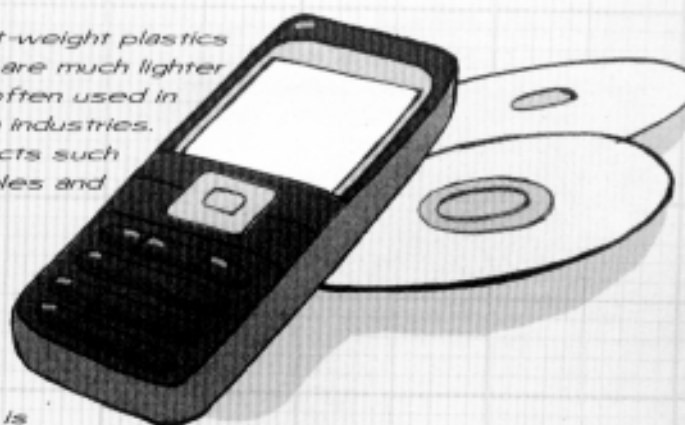
Polypropylene (PP): Considered one of the least toxic plastics, polypropylene nevertheless contains environmentally-damaging flame retardants as additives. It is used for packaging a range of goods, including fertilizers, powdered chemicals and cement, as well as in household items such as crockery, combs, furniture and food containers.



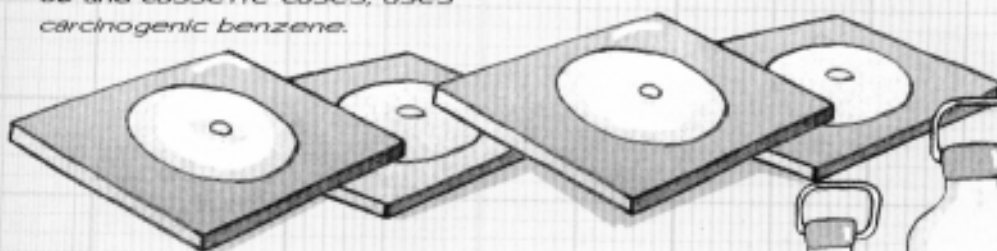
Low-density polyethelene: Also considered to be one of the least toxic plastics, it is a moisture-resistant plastic that is used in damp proofing, lining ponds and canals to prevent seepage, laminating paper, and coating milk and other food cartons.



Engineering thermoplastics: *These light-weight plastics can be melted and reshaped. As they are much lighter than conventional materials, they are often used in the aerospace, transport and telecom industries. They are also used in high-tech products such as mobile phones, CDs, optic fibre cables and car parts.*



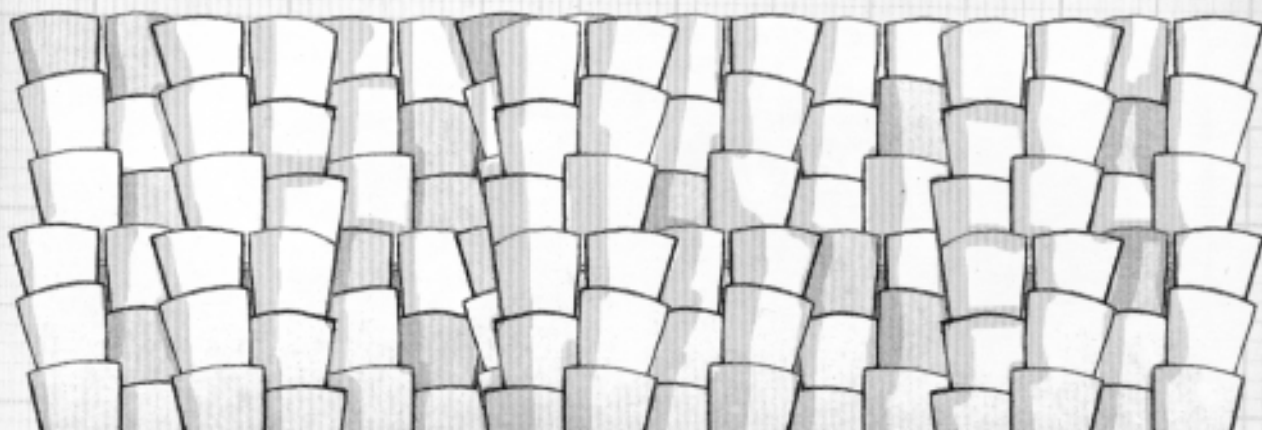
Polystyrene: *This kind of plastic, which is mainly used for packaging and for making CD and cassette cases, uses carcinogenic benzene.*



Polyethylene Terephthalate (PET): *Perhaps the most visible of all plastics, PET is used in mineral water and soft drinks bottles.*



Styrofoam: *The ubiquitous soft white-coloured cup found in soft drink and coffee vending machines is also a kind of plastic. Styrofoam presents a serious environmental hazard, as it may never degrade.*



THE BAN ON PLASTIC BAGS

IN 1999 THE MINISTRY OF ENVIRONMENT AND FORESTS (MOEF) PASSED THE RECYCLE MANUFACTURE AND USAGE RULES, WHICH BANNED SHOPS FROM HANDING OUT CARRY BAGS MADE FROM RECYCLED PLASTICS FOR CARRYING FOOD. THE RULES ALSO SAID THAT VIRGIN OR RECYCLED PLASTICS SHOULD BE OF A NATURAL SHADE OR WHITE BUT NEVER BLACK, AND THEY SHOULD NOT BE LESS THAN 20 MICRONS THICK. THUS FAR, PLASTIC BANS HAVE NOT PROVEN VERY EFFECTIVE, BECAUSE LOOPHOLES IN THE REGULATIONS HAVE LED TO THE CONTINUED USE OF RECYCLED POLYBAGS.



BIODEGRADABLE PLASTICS

RESEARCH HAS BEEN CARRIED OUT RECENTLY INTO BIODEGRADABLE PLASTICS THAT BREAKDOWN WHEN EXPOSED TO SUNLIGHT, WATER, WIND, ENZYMES AND BACTERIA. SOME OF THESE METHODS ONLY WORK IF THE SURFACE OF THE PLASTIC IS EXPOSED. OTHERS REQUIRE CERTAIN CONDITIONS IN LANDFILL AND COMPOSTING SYSTEMS. IN SOME CASES, STARCH POWDER IS MIXED WITH PLASTIC AS A FILLER TO ALLOW IT TO DEGRADE MORE EASILY, BUT IT STILL DOES NOT LEAD TO COMPLETE BREAKDOWN OF THE PLASTIC. A POTENTIAL DISADVANTAGE OF BIODEGRADABLE PLASTICS IS THAT THE CARBON THAT IS LOCKED UP IN THEM MAY BE RELEASED INTO THE ATMOSPHERE AS GREENHOUSE GAS CARBON DIOXIDE, ALTHOUGH IF THEY ARE MADE FROM NATURAL MATERIALS, SUCH AS FROM A VEGETABLE CROP OR ANIMAL PRODUCTS, THERE IS NO NET GAIN IN CARBON DIOXIDE EMISSIONS. SO FAR, HOWEVER, THESE PLASTICS HAVE PROVED TOO COSTLY AND LIMITED FOR GENERAL USE AND CRITICS HAVE POINTED OUT THAT THE ONLY REAL PROBLEM THEY ADDRESS IS ROADSIDE LITTER. WHEN SUCH PLASTIC MATERIALS ARE DUMPED INTO LANDFILLS, THEY CAN BECOME MUMMIFIED AND PERSIST FOR DECADES EVEN IF THEY ARE SUPPOSED TO BE BIODEGRADABLE.



DID YOU KNOW?

DELHI IS HOME TO ASIA'S (PROBABLY THE WORLD'S) LARGEST MARKET FOR TRADE IN PLASTIC WASTE.

IN 1998, PLASTIC BAGS CLOGGED THE DRAINS OF MUMBAI CAUSING WATERLOGGING AND HUGE INCONVENIENCE FOR RESIDENTS.

ALSO IN 1998, A LANDSLIDE CAUSED BY A MOUNTAIN OF DUMPED PLASTIC BAGS LED TO THE DEATH OF 27 PEOPLE IN SIKKIM.

AUTOPSIES ON COWS IN DELHI HAVE SHOWED THEIR INTESTINES TO BE STUFFED WITH 40-45 KG OF PLASTIC BAGS, WHICH WOULD HAVE LED TO A TERRIBLY PAINFUL DEATH.

IF INDIANS WOULD AGAIN START USING TRADITIONAL ITEMS SUCH AS JUTE BAGS AND BAMBOO PRODUCTS INSTEAD OF PLASTIC BAGS, IT WOULD GENERATE AGRICULTURAL EMPLOYMENT FOR AROUND 50 LAKH PEOPLE ACROSS THE COUNTRY.





WHAT YOU CAN DO

CARRY YOUR OWN BAGS WHEN YOU GO SHOPPING.

*REFUSE TO ACCEPT PLASTIC CARRY BAGS
WHEREVER POSSIBLE*

*AVOID FLIMSY, DARK-COLORED
PLASTIC CARRY BAGS.*

*URGE SHOPKEEPERS TO HAND OUT GOODS
IN PAPER BAGS.*

DO NOT BURN PLASTIC WASTE.

REFUSE TO BUY OVER-PACKAGED PRODUCTS

HEAVY METALS TRAIL OF DESTRUCTION

From industries in rural locations dumping toxic waste to everyday household implements, heavy metals such as mercury, cadmium and chromium find their ways into our bodies through many routes. Their effects can be devastating, but thankfully, in most cases, there are simple steps you can take to protect yourself. As long as you know where the dangers lurk,

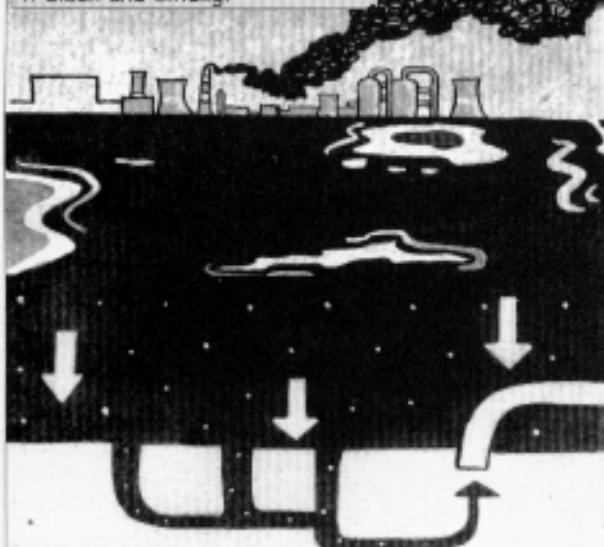
The cauliflower is ready for harvesting.

Alraf Mohammed is not happy with the crop. It's a feeling that's beginning to be chronic.

Ever since that factory has come up, the quality of our vegetables is going down.

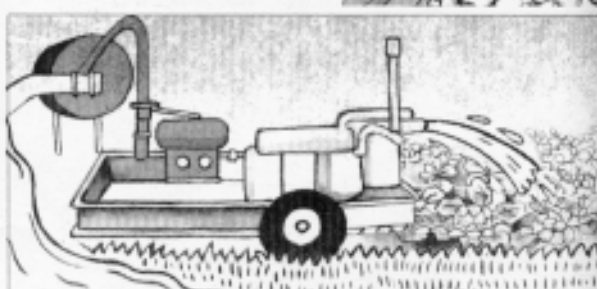


The correlation is self-evident. The dirty sludge that the factory has been pumping into the river has turned it black and smelly.

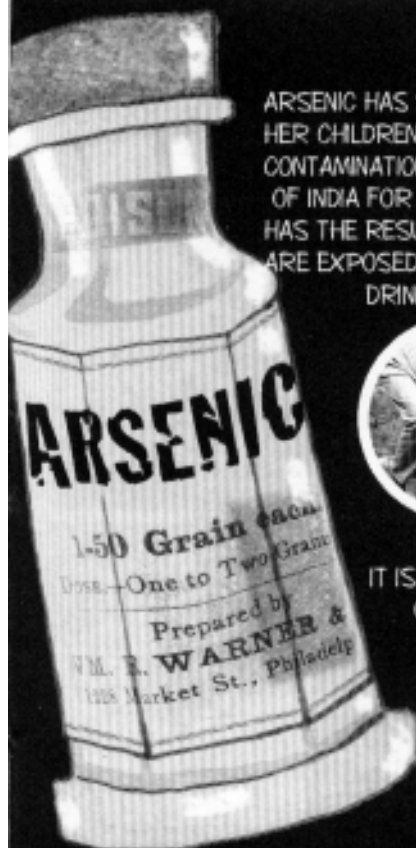


And deep underground, hidden from the sight of the local villagers, chemicals are leaking into the groundwater, polluting the wells and the water that the farmers pump into their fields.

Fumes from the chimneys deposit a fine soot everywhere. The vegetables are no exception.



Arsenic, cadmium, chromium — a toxic cocktail of heavy metals is making its way into the farmers' crops and into their families' veins.



ARSENIC HAS SUFFUSED INTO THE WATER OF THE VILLAGE WELL. IT IS SLOWLY POISONING HER CHILDREN, CORRODING THEIR INSIDES. ARSENIC OCCURS WIDELY IN NATURE, AND ARSENIC CONTAMINATION OF GROUNDWATER HAS BEEN A NATURAL PHENOMENON IN VARIOUS REGIONS OF INDIA FOR A LONG TIME. OF LATE, HOWEVER, ITS USE IN INDUSTRIES HAS RISEN AND SO HAS THE RESULTANT ARSENIC CONTAMINATION OF GROUNDWATER FROM EFFLUENTS. HUMANS ARE EXPOSED TO THE HEAVY METAL LARGELY THROUGH

DRINKING WATER, INDUSTRIAL EMISSIONS AND MINING.



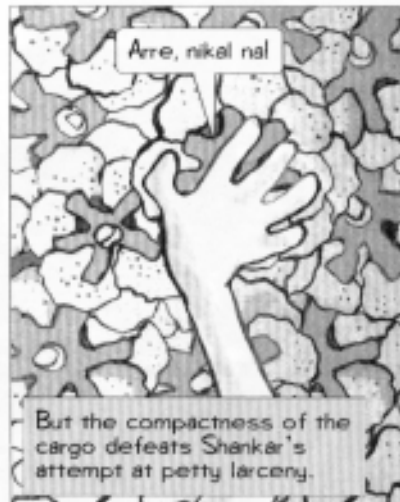
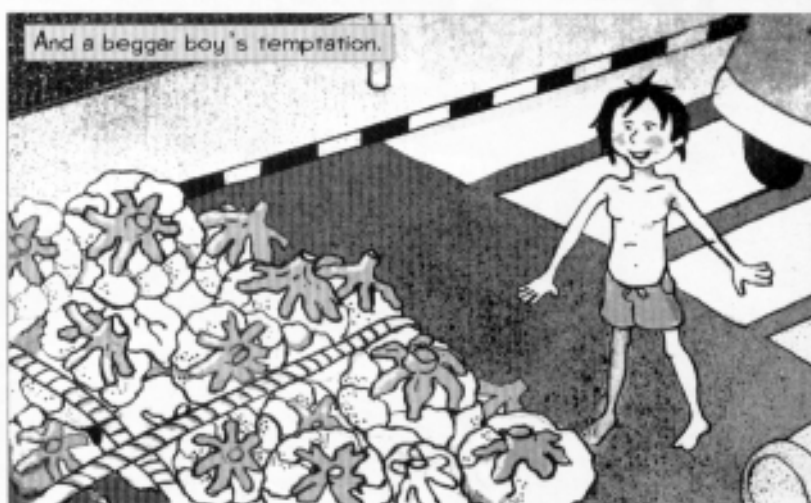
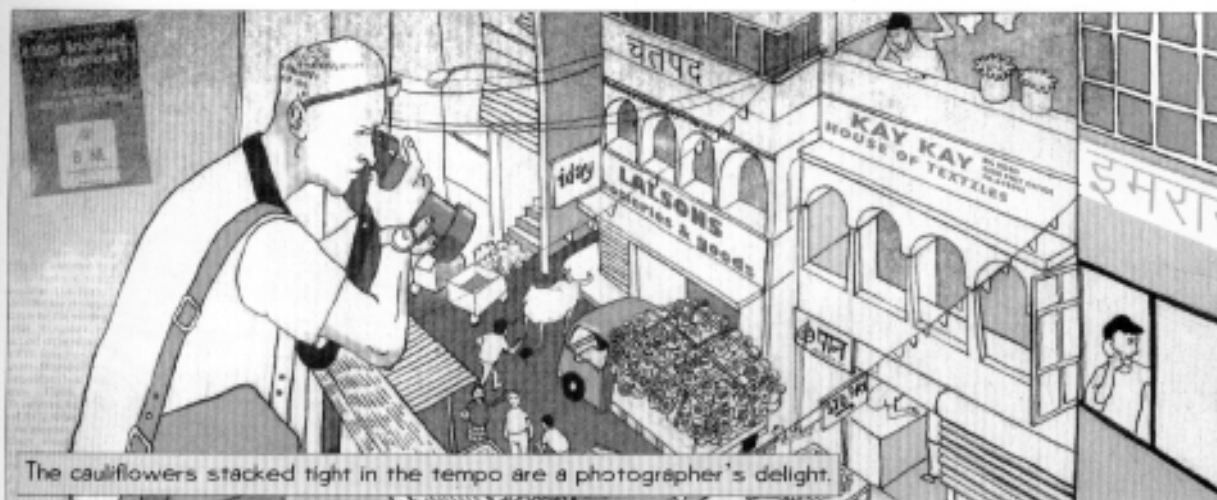
IT IS ALSO FOUND IN VARIETIES OF FISH AND SHELLFISH

AS WELL AS PAINTS, RAT POISON, FUNGICIDES AND WOOD PRESERVATIVES.

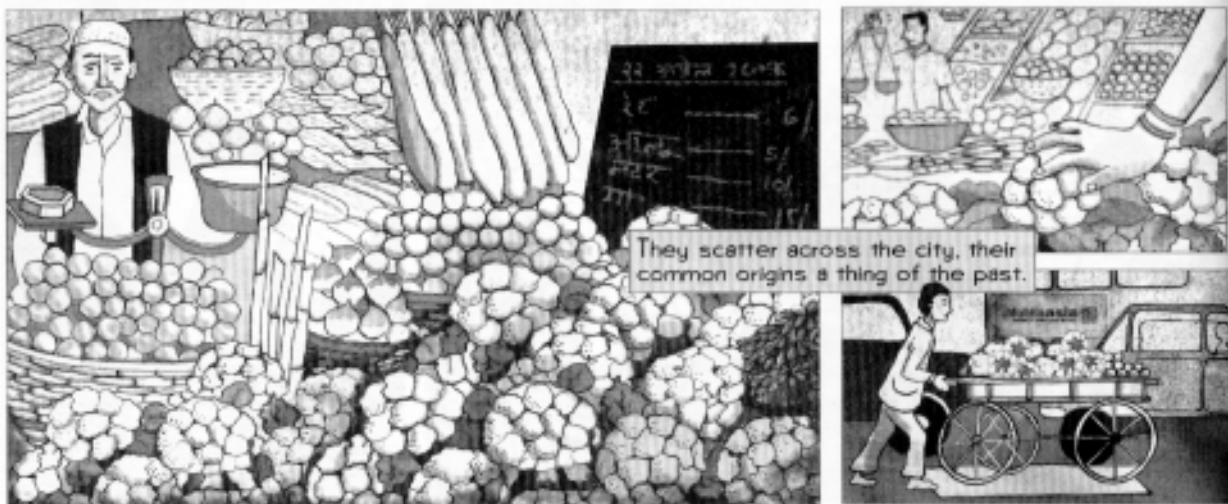


ORGANIC ARSENIC, WHICH IS ABUNDANT IN SEAFOOD, IS RELATIVELY HARMLESS TO THE HUMAN BODY AND IS READILY ELIMINATED. HOWEVER, ARSENIC IN DRINKING WATER IS EXTREMELY HARMFUL. SHORT-TERM HIGH-DOSE EXPOSURE TO THE HEAVY METAL CAN CAUSE DIARRHEA, ABDOMINAL PAIN AND VOMITING. LONG-TERM LOW-DOSE EXPOSURE, WHICH IS WHAT HAPPENS DUE TO WATER CONTAMINATION, LEADS TO CANCER OF THE LUNGS, BLADDER AND KIDNEY, AND OFTEN ALSO CAUSES CHANGES IN SKIN PIGMENTATION AND THICKENING.





The tempo makes its way to the mandi. The cauliflowers are unloaded, auctioned and distributed among vegetable vendors.

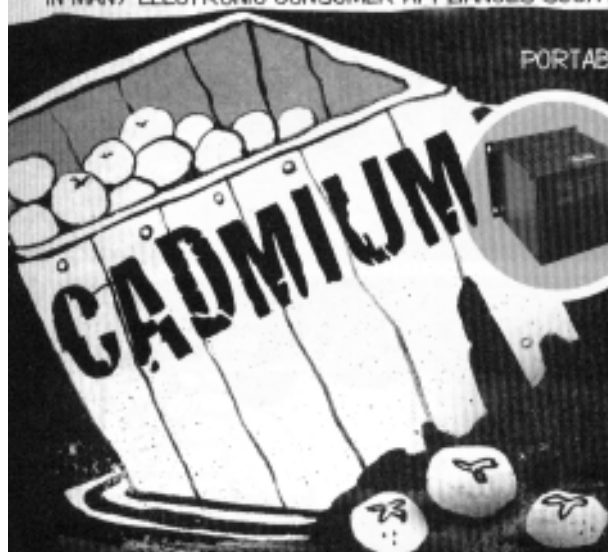




But the murky waters of the canal are tainted by sewage, which adds more cadmium to the vegetables.

A WHITE, SOFT AND FLEXIBLE METAL, CADMIUM OCCURS NATURALLY AS A METALLIC COMPONENT IN THE EARTH'S CRUST AND OCEANS. THE METAL IS PRESENT EVERYWHERE IN AIR, WATER AND SOIL. IT IS USED IN MANY ELECTRONIC CONSUMER APPLIANCES SUCH AS

VOLTAGE STABILIZERS, CORDLESS TELEPHONES, PORTABLE HOUSEHOLD APPLIANCES AND BATTERY-OPERATED TOYS.



INDUSTRIAL USES INCLUDE AIRCRAFT AND RAILROAD APPLIANCES.



SHORT-TERM EXPOSURE TO CADMIUM WILL CAUSE NAUSEA, VOMITING, DIARRHEA AND MUSCLE CRAMPS.

IN THE LONG TERM, SUSTAINED INTAKE OF CADMIUM CAN SERIOUSLY AFFECT KIDNEY AND LIVER FUNCTIONS. EXPOSURE TO CADMIUM OCCURS THROUGH PRODUCTS SUCH AS PIGMENTS AND COATINGS IN BATTERIES, BUT ALSO SIGNIFICANTLY THROUGH CONTAMINATED FOOD OR WATER. A FOOD SAFETY STUDY HAS REVEALED THAT VEGETABLES SOLD AT ROADSIDE STALLS HAVE HIGH CONCENTRATIONS OF CADMIUM.

When Mrs Sachdeva comes shopping, she has little inkling of the arduous journey her chosen cauliflower has made to get to her shopping bag.

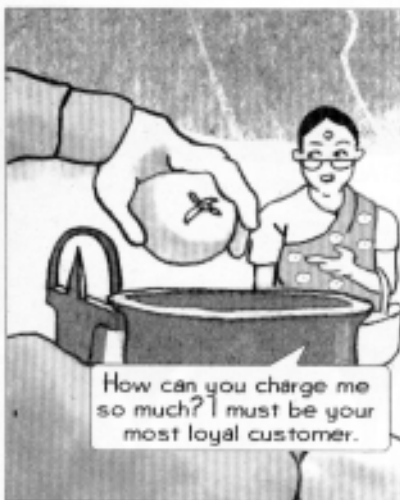


Ballu, half the peas you gave me the last time had keedas.

Don't worry, maaji — today's maal is absolutely fresh. Just come from the mandi.



Nor does she know of the chemical accoutrements it has acquired at different stages of that journey.



How can you charge me so much? I must be your most loyal customer.



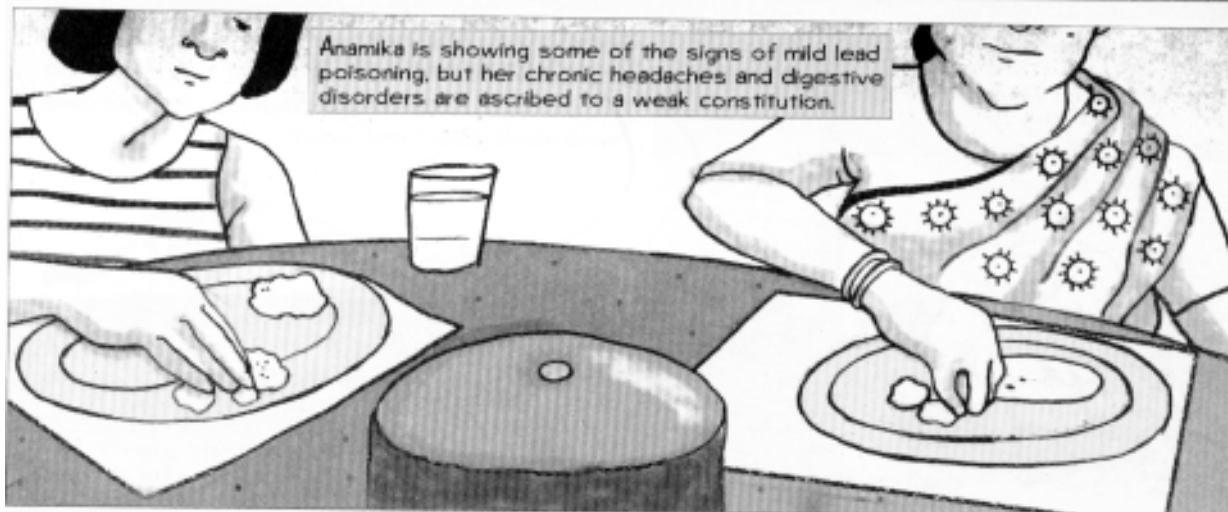
Kya karoon, maaji? Costs have gone up again.



Well, at least don't be so stingy with the chilies.



All that concerns her is that the vegetable she has selected is firm and fleshy, and that her aloo gobi turns out to her family's liking.



LEAD IS A BLuish-white lustrous metal, which is very soft and highly malleable. LEAD IS USED TO A LARGE EXTENT IN STORAGE OF PETROLEUM PRODUCTS, BATTERIES, CABLE COVERING, PLUMBING, FINE CRYSTAL AND AMMUNITION.



IN PEOPLE'S DAILY LIVES, THE HEAVY METAL IS USED IN SOME PAINTS. IT ALSO ENTERS THE AIR THROUGH AUTOMOBILE EXHAUST, BUT THE RECENT MOVE TOWARDS UNLEADED FUEL HAS REDUCED THAT THREAT TO SOME EXTENT. THOUGH LEAD IS HIGHLY TOXIC TO ALL HUMANS, CHILDREN BELOW THE AGE OF SIX ARE WORST AFFECTED. FOR CHILDREN, ALTERNATIVE ROUTES INCLUDE PLAYING WITH LEAD-COATED TOYS OR IN LEAD-CONTAMINATED SOIL.

LEAD POISONING CAN SLOW GROWTH AND CAUSE HEARING PROBLEMS AND PROLONGED HEADACHES IN CHILDREN. NERVE DISORDERS, MEMORY AND CONCENTRATION PROBLEMS, DIGESTIVE DISORDERS AND MUSCLE AND JOINT PAINS ARE POSSIBLE OUTCOMES OF LONG-TERM EXPOSURE. HIGH-DOSAGE EXPOSURE TO LEAD AFFECTS THE NERVOUS SYSTEM AND CAN EVEN CAUSE BRAIN DAMAGE.

As a child, Anamika was regularly exposed to lead in the paint which their new house was painted with. The older members of the family had systems that could cope with the onslaught. But for the young girl, her new home came with the free gift of "a weak constitution."



That is the trouble with many of the symptoms of today's pollutants. They are so hard to pin down and attribute to a specific cause.



And so often, one isn't even aware of the route through which these chemicals invade our bodies.



But since the truth about heavy metals is well-known, it's better to be safe than sick.

presented
the
NGOs, so
The

What are heavy metals?

The term heavy metal refers to any metallic chemical element that has a relatively high density and is toxic or poisonous at low concentrations. Examples of heavy metals include mercury (Hg), cadmium (Cd), arsenic (As), chromium (Cr), thallium (Tl) and lead (Pb).

Heavy metals are natural components of the Earth's crust. They cannot be degraded or destroyed. To a small extent they enter our bodies via food, drinking water and air. As trace elements, some heavy metals (for example, copper, selenium, zinc) are essential to maintain the metabolism of the human body. However, at higher concentrations they can lead to poisoning. Heavy metal poisoning could result, for instance, from drinking-water contamination (such as from lead pipes), high ambient air concentrations near emission sources, or intake via the food chain.

Heavy metals are dangerous because they tend to bioaccumulate. Bioaccumulation means an increase in the concentration of a chemical in a biological organism over time, compared to the chemical's concentration in the environment. Compounds accumulate in living things any time they are taken up and stored faster than they are broken down (metabolized) or excreted.

Heavy metals can enter a water supply by industrial and consumer waste, or even from acidic rain breaking down soils and releasing heavy metals into streams, lakes, rivers and groundwater.

Of all the heavy metals, those commonly found that are highly toxic and hazardous in nature are lead, mercury, cadmium and arsenic.

Source: <http://www.jennitech.com>



Wastewater irrigation makes vegetables toxic: Study

Vegetables grown in semi-urban areas, which use industrial wastewater for irrigation, have high levels of heavy metals such as lead, which is neurotoxic, and cadmium, which can cause cancer, according to a study by Indian and UK scientists. The study, carried out by researchers from the University of Sussex, Toxics Link (a Delhi-based environmental NGO), Delhi University and the Benaras Hindu University, established an "unambiguous relationship between heavy metals contamination in food crops and its source in wastewater from industries, treatment plants and municipal and domestic source."

The scientists said that, in a rapidly urbanizing world, where there is increasing concern about freshwater shortage, the practice of using wastewater for irrigation of food crops in urban fringe (peri-urban) areas is encouraged. One potential risk of wastewater use is the contamination of food as a result of industrial pollution. It can have serious implications for the health and livelihoods of those that consume produce that was grown with wastewater irrigation.

The study was carried out during 2003–2007 in three areas of Varanasi — Dinapur (in the vicinity of the city's major sewage treatment plant), Shivpur (to the north east of the city, close to the Shivpur industrial area) and Lohta (to the west of the city close to several industrial areas).

The heavy metals sampled include zinc, lead, copper, cadmium, chromium, manganese and nickel. Of these, potentially the most toxic are cadmium and lead. These heavy metals are widely associated with many small-scale industries in Varanasi that include metal works, paper manufacturers and chemical and paint works. Vegetables such as spinach, radish, brinjal, cauliflower, tomato and cabbage were tested.

Source: The Statesman, July 23, 2007

Routes to the body

The main reason for groundwater contamination in India is the practice by rogue industries of discharging industrial effluents in an unregulated manner. This is true of urban as well as rural areas. Studies show that vegetables such as spinach, cauliflower and ladyfinger, often cultivated alongside sewage flow and irrigated by wastewater, have unsafe concentrations of lead, zinc and cadmium.

Traditional medicines, especially those used in the ayurveda system, contain significant quantities of lead, arsenic and mercury. The intake of these medicines also provides a pathway for the entry of heavy metals into the human body.

Study shows Indian paints high on lead

A study by Toxics Link found dangerously high amounts of lead in household paint samples picked from Delhi and Mumbai markets. The study, titled "A Brush with Toxics: An Investigation on Lead in Household Paints in India," was the most comprehensive research on the issue, both in terms of the sample size and the range of paint types. The samples were tested at Galson Laboratories, New York.

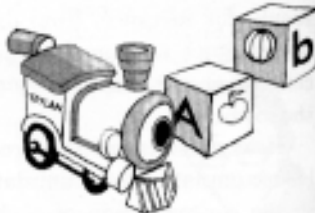
The purpose of the study was to determine the total concentration of lead in decorative paints of all types — plastic, enamel and exterior — intended for residential use. Although lead as a source of health hazard has been studied in soil, atmosphere and toys, very few studies had earlier been done on paints in India.

The research showed alarming levels of lead in enamel paints. This was found to be the case for most of the paints available in the market. Except for one brand, all others had multiple samples that contained high concentrations of lead, exceeding the voluntary Indian standard of 1,000 parts per million or ppm (0.1 percent) and the US standard of 600 ppm. Most enamel paint samples had lead concentration ranging from 2 percent to 14 percent.

Toxic toys

Dangerous levels of lead and cadmium have been found in PVC and soft toys being sold in Indian markets, indicating that children are being exposed to severe health hazards caused by these metals, ranging from liver damage to disruption in mental growth. Alarming levels of lead and cadmium were found in PVC soft toys in a study conducted in Delhi, Chennai and Mumbai in 2007. There are no legal and binding standards that stipulate the safe limits of the heavy metal contents in toys (plastic or otherwise), locally manufactured or imported. The issue of safety is left largely to the manufacturers' discretion and judgment, since the BIS compliance codes are only voluntary.

All toys sampled in the study contained varying concentrations of lead and cadmium. Eight samples (close to 30 percent) from Mumbai contained



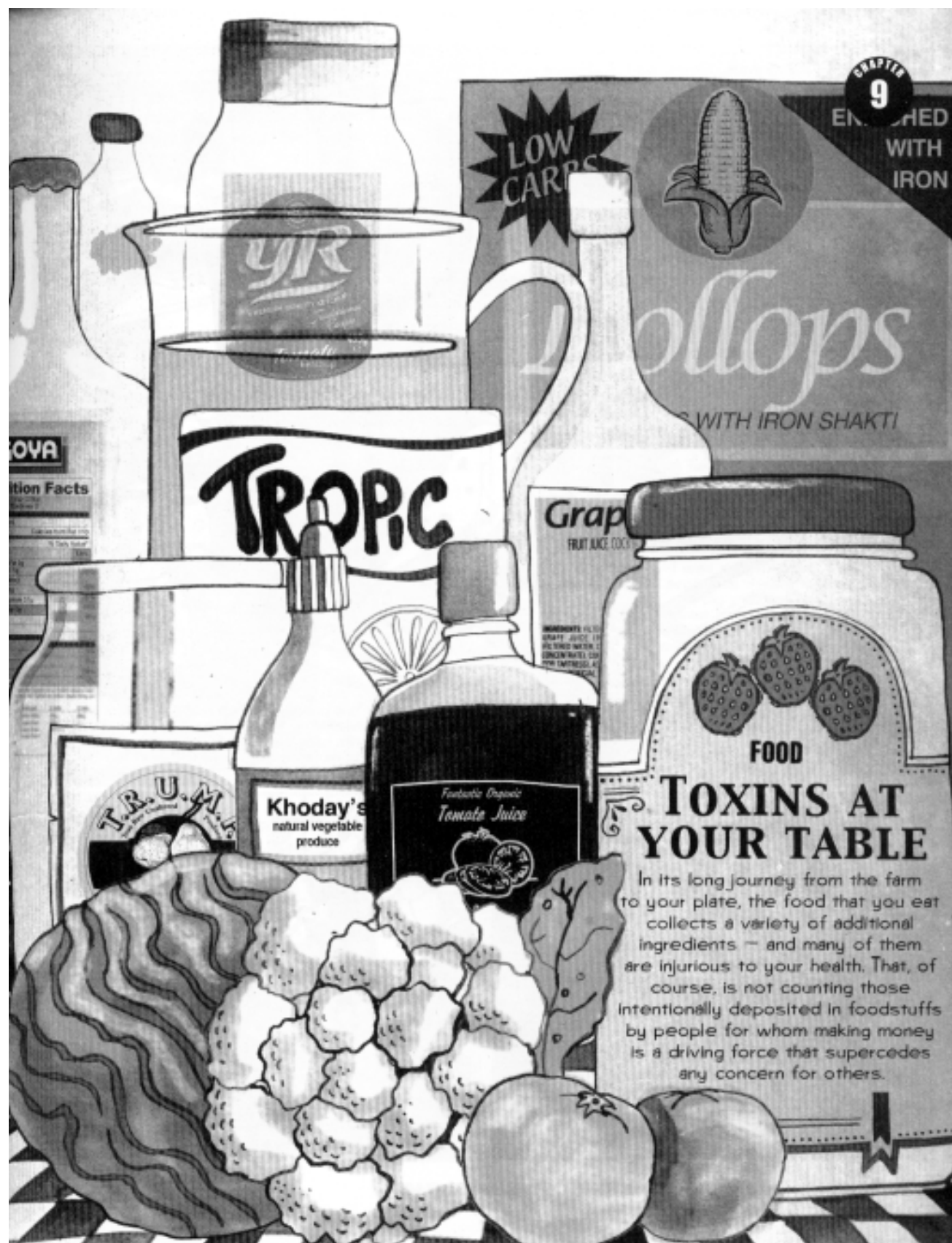
more than the US CPSC standard of 200 ppm of lead in vinyl blinds. Five samples (close to 20 percent) had more than 600 ppm of lead, which is the limit set by US EPA for painted toys.

A separate investigation by Toxics Link and television news channel CNN-IBN found that branded toys, many claiming to be non-toxic, in fact, contain dangerous amounts of lead.

The Special Investigation Team began the probe by randomly buying toys from various toy stores in Delhi. These samples were then scientifically tested for lead. The results showed that a staggering 65 percent of the toys tested were contaminated with lead and 14 percent of the samples were heavily contaminated.

The internationally accepted danger mark for lead in toys is 90 ppm. But the laboratory tests conducted on the toys revealed lead content from 190 ppm to 600 ppm.

These contaminated toys were not only Chinese, but branded Indian toys available at leading stores across the country. Products like teethingers, a segment ball and other rubber toys meant for three-month-old children were found to be the most toxic.



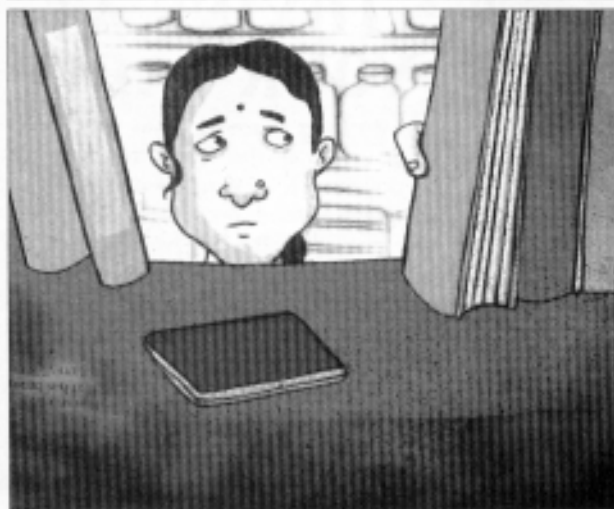
TOXINS AT YOUR TABLE

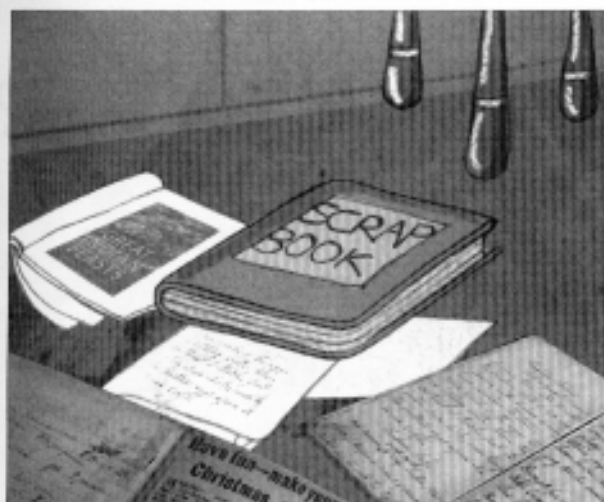
In its long journey from the farm to your plate, the food that you eat collects a variety of additional ingredients — and many of them are injurious to your health. That, of course, is not counting those intentionally deposited in foodstuffs by people for whom making money is a driving force that supercedes any concern for others.

Once every few months, Rajeshwari Sachdevs gets bored with the kitchen the way it is, and she and Bindu take it apart and put it back together again.



It's a process which has two secondary benefits — the shelves and the stuff on them stay clean, and junk that was accumulating gets roused out.





Mineral water or chemical cocktail?

Pesticides found in bottles of premium brands

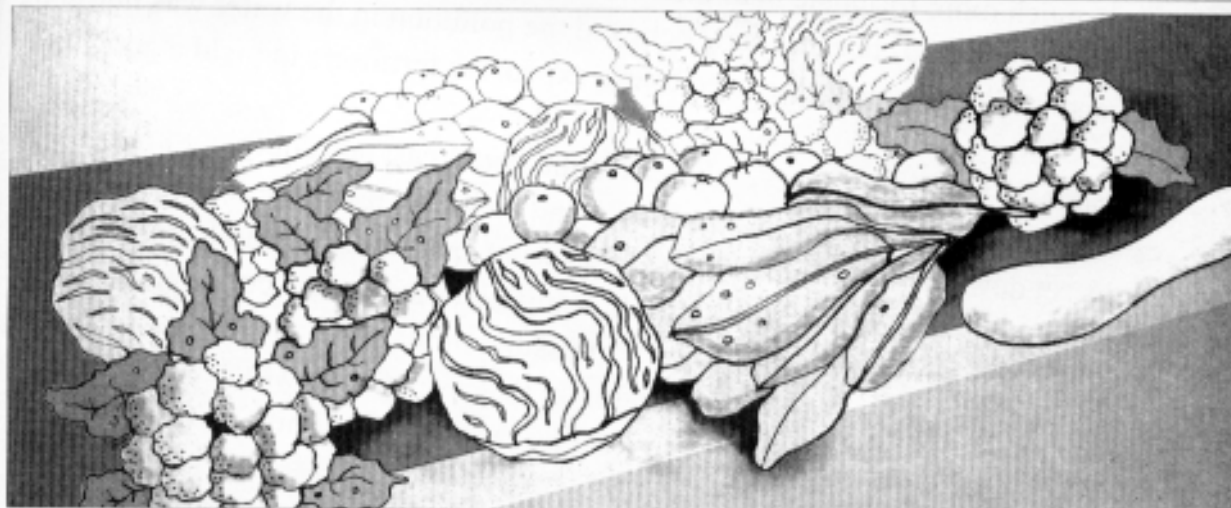
Study reports contaminants in food items

NGO petition: Give Indians the Right to Safe Food

NEW DELHI: An NGO has applied to the Supreme Court of India for an intervention to ensure food safety. The move was prompted by numerous studies, which showed serious contamination of milk, butter, grains, vegetables and poultry by heavy metals, pesticides and artificial colours.

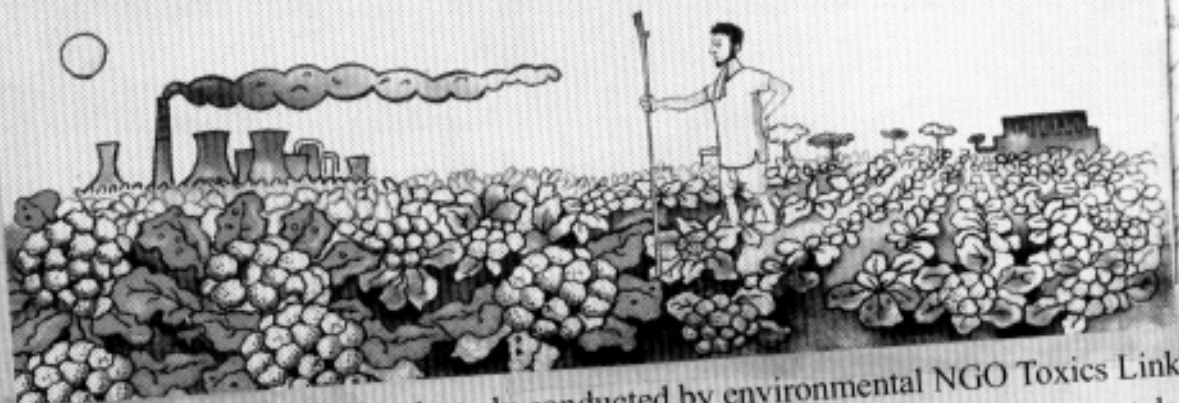
The upsurge in food safety awareness has come at a time when nutrition experts were shifting their focus from malnutrition to widespread chronic shortages of micronutrients, particularly iron and vitamin A. For the past few years, their efforts have increasingly focused on the consumption of fresh fruit and vegetables, rather than tackling food shortages. But increasing production of fruit and vegetables to meet the rising demands of a burgeoning urban population has to be coupled with consumers' rights to eat safe food, free from contamination and pollutants.

(Continued on page 2)



Toxins In Your Kitchen

Research reveals heavy metal contamination of vegetables



VARANASI: A new research study conducted by environmental NGO Toxics Link and the Imperial College of London has revealed high levels of toxic heavy metals in the vegetables we eat. The study, begun three years ago in the city of Varanasi where industries have developed in traditionally agricultural areas, found that the practice of irrigating crops with waste water increased concentrations of heavy metals in soil and plants, and levels were frequently higher than permissible limits.

Farmers using waste water in these areas often reported that they considered themselves much more fortunate than those who used non-polluted water for irrigating their crops because they believed the pollution in the water was nutrient rich and so did away with the need to use expensive fertilisers to yield a good crop.

Researchers found that in several areas to the north, east and south of the city, cadmium, copper, manganese, chromium and nickel levels in the water exceeded limits set down by the United Nations. Levels of cadmium, lead and zinc in many important vegetables including spinach, cauliflower and radish collected from August 2003 to May 2004 exceeded permissible limits set by the Government of India and posed a threat to human health. In the case of lead, which can cause nerve and brain damage, 72% of the samples crossed PFA limits.



At least in this case, it's much easier than that. It seems the way to deal with the vegetable contamination is simply to wash them thoroughly in running water.



Don't I know it? I'm the one who has to do all the washing.



Food adulterants

Common adulterants that can pose a serious health hazard:

Sand, grit and filth – may be found in food grains, spices and pulses. They can damage teeth and have an adverse effect on the soft lining of the digestive tract.

Talc stone and chalk powder – usually found in wheat flour and spices. Talc is hydrated magnesium silicate, which the human system cannot digest. It impairs the smooth running of the digestive system and can cause stomach cancer.

Excessive lime – found in dry ginger. Makes the gastric lining rough and dry.

Excessive salt – present in ready-to-use spices and curry powder because it is cheaper and increases the weight and profit margins.

Rancid/old oil – sometimes mixed with good oil to mask the unpleasant odour before being sold. Foods cooked in old oil lose their vitamin content.

Toxic colourings – play an important part in food acceptability. The common non-permitted colours used are mineral pigments like lead chromate and earth colour dyes like metanil yellow. Ingesting these colours can cause abnormalities of bones, eyes, skin, lungs, ovaries, testicles, mental retardation and anaemia.

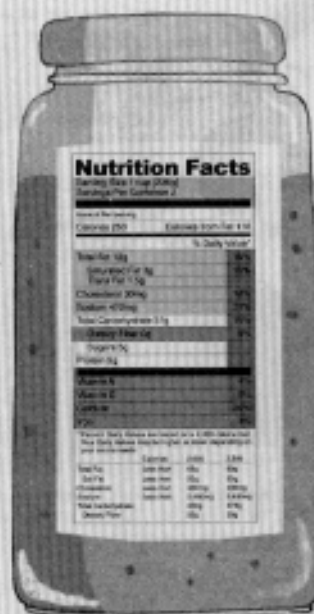
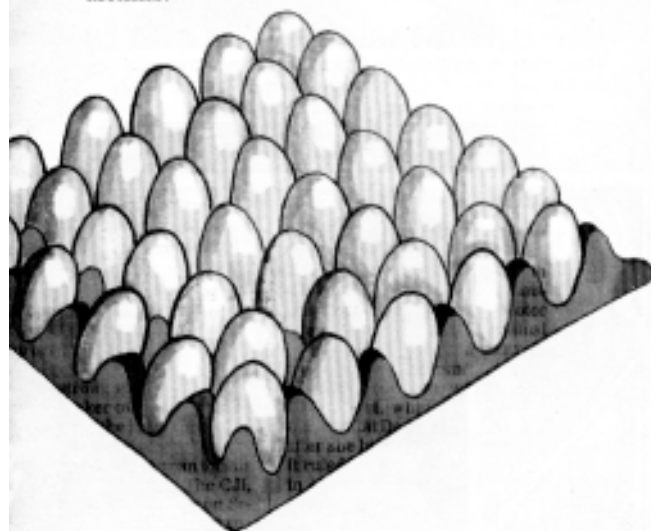


Dioxins in eggs

Dioxins are among the most poisonous chemicals known to man, yet they have found their way to our dining tables. A study involving 17 countries carried out in 2005 by the International POPs Elimination Network found that chicken eggs in India contained high levels of dioxins and polychlorinated biphenyls (PCBs). Dioxin levels were found to be 5.5 times higher than the European Union safe limit for eggs, while levels for PCBs were 4.7 times higher than the safe limit.

The negative health effects of dioxins include cancer, reduced immunity, disorder of the nervous system and birth deformity. They are produced as unintentional by-products from incineration of toxic and urban waste, the manufacture of chlorinated solvents and pesticides, as well as from production and disposal of the plastic PVC. Human exposure to dioxins is primarily from food intake.

The report, which was the first to look at dioxin levels in chicken eggs in India, showed that the main source of the toxic chemical is chicken feed. The study was carried out close to a biomedical waste incinerator, which could have been a source of the dioxins.



Food labeling

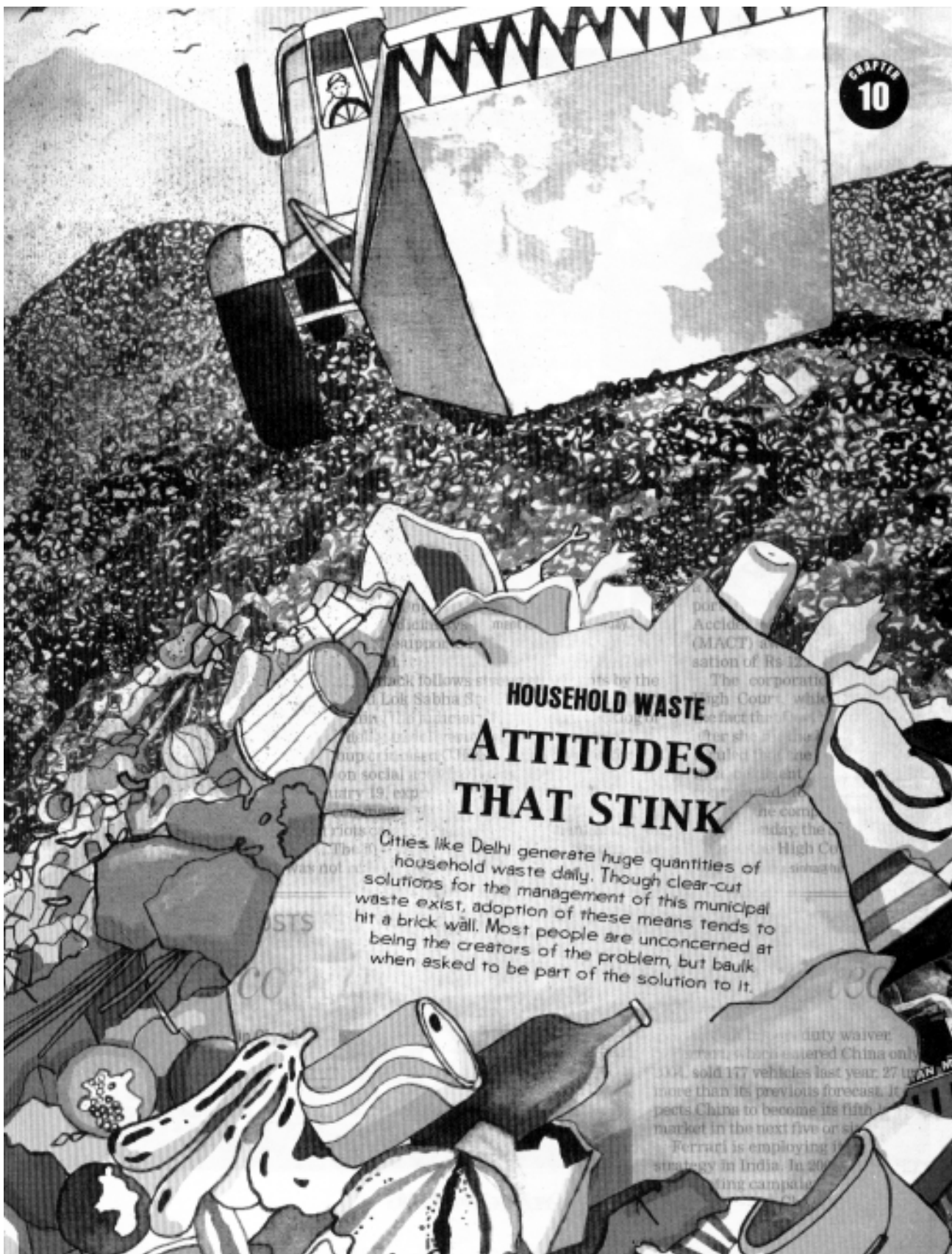
Many substances are added to food in order to enhance their appearance or shelf life and therefore their marketability. In recent years, some of these food additives have come under the spotlight, and many have been banned due to their connection with various reported health disorders. The Prevention of Food Adulteration (PFA) Act, 1954 aims to prevent the adulteration of food with harmful substances, but its scope is limited.

The only way to find out what exactly is in your food before you buy it is to look at the label. In India, though, food labeling is still in its infancy and the information provided is very scant. Regulations regarding food labeling standards deal only with the weight and measurement of food, the size of the label, the text used and other statutory regulations like maximum retail price. It is not mandatory to declare the name of food colorings, preservatives and other additives.

HOUSEHOLD WASTE ATTITUDES THAT STINK

Cities like Delhi generate huge quantities of household waste daily. Though clear-cut solutions for the management of this municipal waste exist, adoption of these means tends to hit a brick wall. Most people are unconcerned at being the creators of the problem, but balk when asked to be part of the solution to it.

The 100% duty waiver for imports of luxury cars, which entered China only in 2004, sold 177 vehicles last year, 27% more than its previous forecast. It expects China to become its fifth largest market in the next five or six years. Ferrari is employing a similar marketing strategy in India. In 2004, it launched a marketing campaign.







Inside, it is like some scene from the Inferno, minus the flames. A mountain of waste dwarfs the people who work on it.

Oh, my God! It's
so... so...

Difficult to find words, isn't it? I
feel exactly the same, and I see
it quite often.

The city produces close to 7,000
tonnes of municipal waste EVERY
DAY. A lot of it lands up here.





How many such places are there?

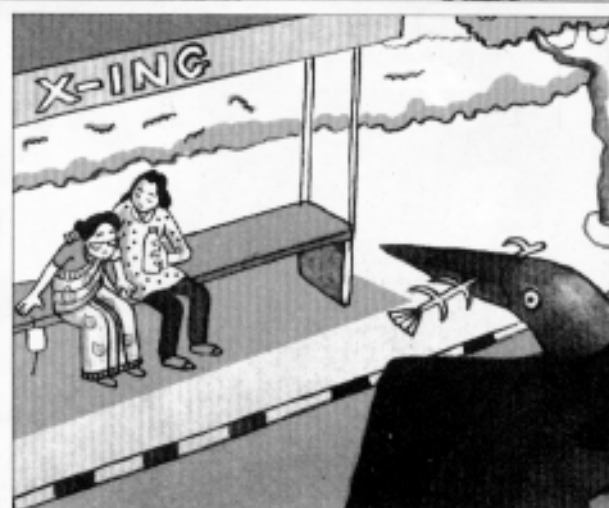
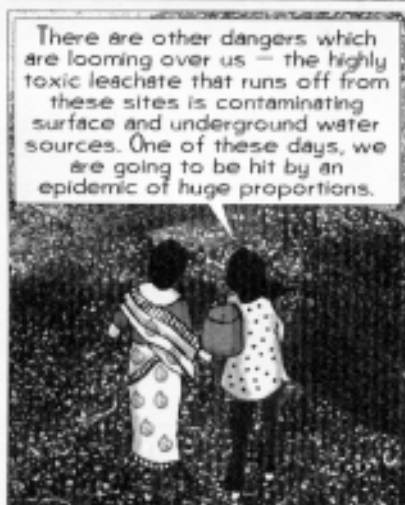


Three that are active right now, two of which are almost full. Some have already been closed down after it became impossible to add any more garbage to them. There are also plans to open three more landfills at new sites.



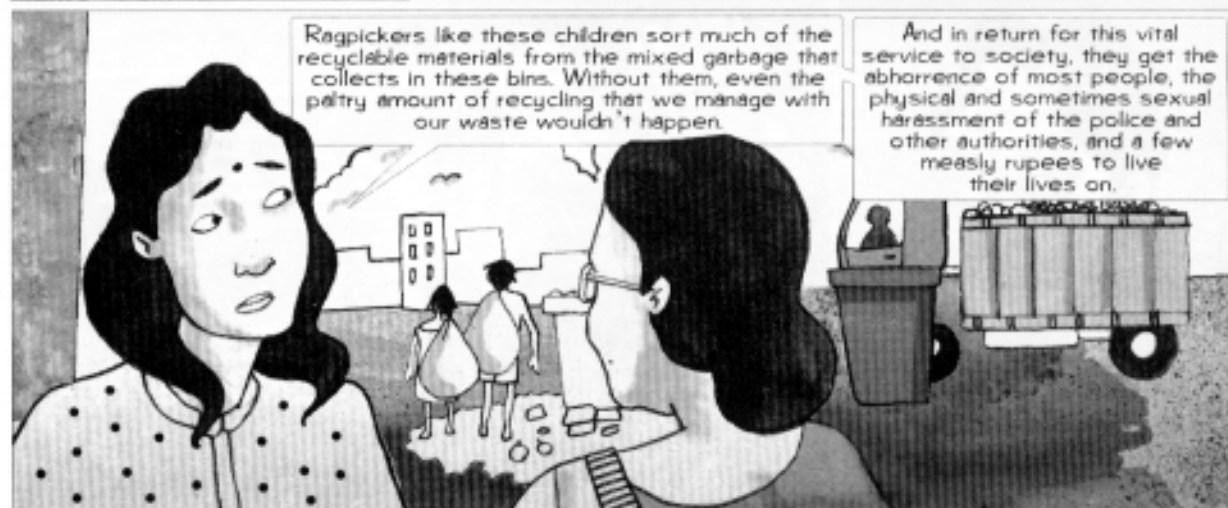
When you say closed down, what does that mean?













How terrible, how utterly terrible. We call ourselves incredible India, shining India, mera Bharat maahan, and let so many of our citizens live like this. I feel so ashamed.



The way I deal with it is to turn that shame into action. We all need to do what we can to sort these issues out.

Yes, this certainly seems to be one area in which we can make a difference. After all, we are the ones who are generating this waste. It seems to me that the first step would be to cut down on how much we generate.



Yes, absolutely. There's a principle called the 3 'R's, and the first R is for Reduce. That is, reduce the amount of wasteful material you use. The second R stands for Re-use — like in my house, instead of throwing out our old fridge, we use it as a cabinet to store our documents, pet medicines, stationery, and what-not.

The third R is for Recycle, but for that you need institutional support, and it's sorely lacking in India. We have a tradition of recycling, but the waste generation now outstrips that tradition by miles.

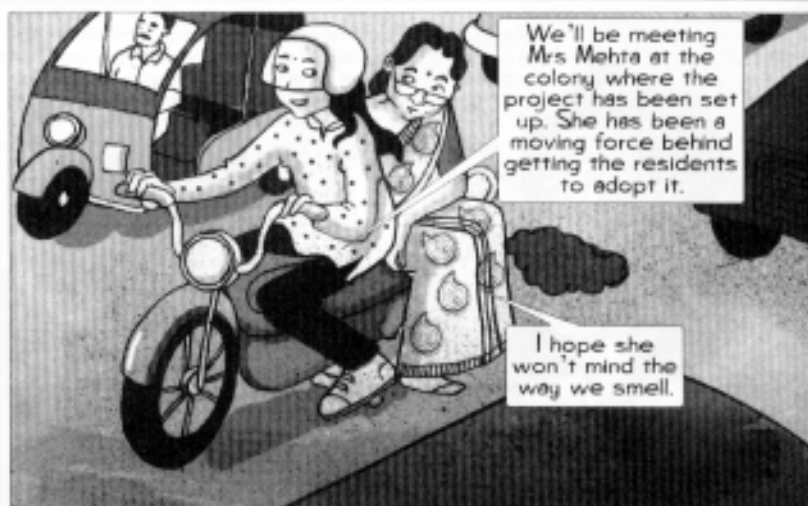


So even with these three 'R's, can we manage the situation as it exists?

Yes, this is one problem that CAN be tackled. Several pilot projects have shown that there are ways. We at Manthan have also got one such project running. That's where I'm taking you next.



Finally, something positive. I'll be glad to see this.



We'll be meeting Mrs. Mehra at the colony where the project has been set up. She has been a moving force behind getting the residents to adopt it.

I hope she won't mind the way we smell.

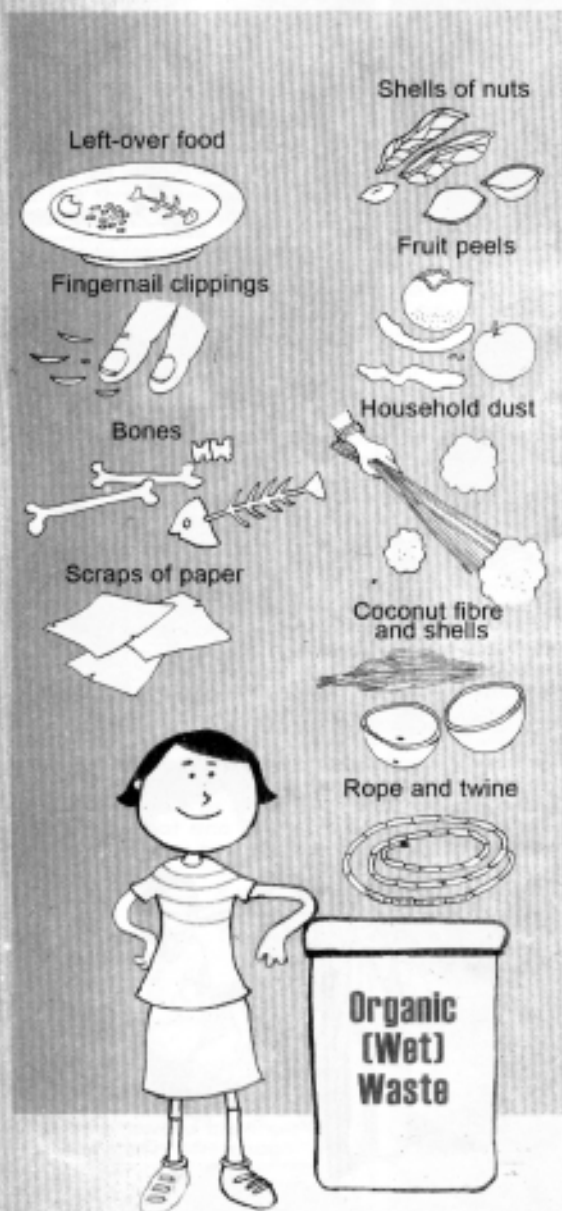




In the beginning, we all had problems. But Machavi had given us these posters which told us what goes where.

Segregate your Waste at Source

A small step for your home, a giant leap for the earth







As Madhavi drives her home, Rajeshwari's mind is buzzing. It's been a roller-coaster of a day — taking her from the dizzying depths of despair at society's wastefulness to a wave of hope that solutions are possible. A thought strikes her.

Madhavi, this solution seems so simple and obvious. Why is it not universally adopted?

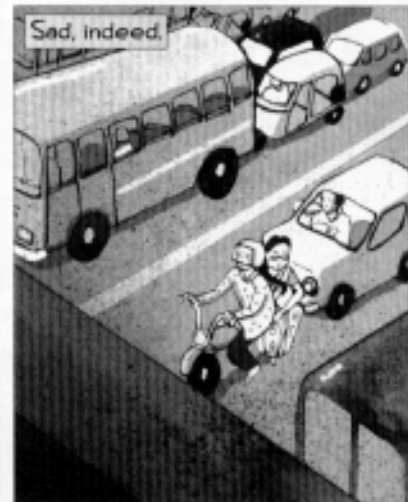


Largely people's short-sightedness, Aunty. One of the biggest stumbling blocks we have usually run into is that no one is willing to put aside space for the compost pits. Especially in places where the smell might reach them.

I understand. People are willing to create the stink, but not to have to smell it. It's really sad.



Sad, indeed.



Compost it!

Composting is nature's own way of recycling. It is the process of producing nutrient-rich compost from the aerobic decomposition of biodegradable organic matter. The resulting dark, crumbly material makes an excellent slow-release soil fertilizer.

Composting is the easiest and most appropriate way to deal with the majority of India's waste, given its predominantly organic nature. It is an easy way to recycle kitchen and garden waste such as vegetable peelings, plant cuttings and leaves, and it is a critical step in reducing the volume of garbage that is sent to landfills.

India's 35 largest cities alone can provide 5.7 million tonnes of organic manure a year if their biodegradable waste is composted and returned to the soil. This could generate enormous national savings and help clean up urban India. There is no other national program that could bring such huge benefits to urban and rural India. Composting can reduce the total amount of municipal solid waste by 40 percent, significantly cutting the amount of garbage sent to landfills.

Composting can be carried out in three main ways: aerobic — in the presence of air; anaerobic — in the absence of air; and vermicomposting — with the help of earthworms.

Aerobic composting requires the correct mix of carbon, nitrogen, oxygen and water. Once a week, leaf litter, water and soil are added to a pit of organic kitchen waste and the mixture is turned. An effective compost pile should be kept about as damp as a well wrung-out sponge. This provides the moisture that all life needs to survive. Microbes and other bacteria begin to break down the material. The larger the material's surface area, the faster this happens. Once the pit is full, the contents are turned every three days to aerate the mixture. The compost is ready to use within two to three months, at which point it starts to resemble dark brown soil.

Anaerobic composting requires more time and is commonly used for treating sewage or managing animal waste. It can cause odor problems and so needs greater controls than aerobic composting. It generates far less heat than aerobic decomposition, which is a definite disadvantage, as high tempera-



tures are needed for the destruction of pathogens and parasites. Although pathogenic organisms do eventually disappear due to the unfavorable environment, it takes much longer and the material must be held for up to a year.

Vermicomposting uses earthworms to break down the matter. This low-cost method of cleaning up the environment requires very little work, produces no offensive odors and helps plants thrive. Only a few things are needed to make good worm compost: a bin, bedding, worms and worm food. After about 45 days, the worms and microorganisms will have converted the entire contents of the bin into rich compost. Vermicomposting has immense potential and has been very successful on a small scale at the community level. There are no examples of vermicomposting being used on a large scale. However, there is no reason why the technique cannot be modified and tried on large amounts of waste.

Waste is not for burning

Taking waste out to the backyard and burning it may seem like a quick and easy way to get rid of small amounts of household rubbish, but it can have serious environmental effects, causing the release of dioxins and furans.

Dioxins and furans are among the deadliest chemicals known to man and are potent carcinogens. The cancer risk due to dioxins is 1,000 to 10,000 times higher than generally accepted levels. They can also cause reproductive and developmental problems, reduce sperm count and damage the nervous system.

Dioxins are produced when organic material is burned in the presence of chlorine, which is found in treated wood and plastics. They can be carried long distances when released into the air and as a result are found almost everywhere at low levels.

Since dioxins dissolve in fats, they bioaccumulate as they move up the food chain. By the time they reach humans at the top of the food chain, primarily through foods such as meat, dairy products and eggs, they have their most harmful effect. Dioxins along with other Persistent Organic Pollutants or POPs (see the chapter on Chemicals) are subject to the Stockholm Convention.

The treaty obliges signatories to take measures to eliminate, where possible, all sources of dioxin. In 2006, India ratified the Stockholm Treaty but production, trade and use of POPs continues.



A waste management pilot scheme

A pilot scheme set up by Toxics Link in Delhi's Defence Colony showed just how much waste could be saved from landfills through community-based recycling and composting initiatives.

The trial revealed that the target block of 1,000 houses was sending about 1 tonne of waste per day to landfill sites. Of that, around 600–700 kg was wet waste, of which 350 kg was composted.

The total amount of recyclables collected from the block of 1,000 houses each day was 250–350 kg. As a result of the scheme, around 600–700 kg of waste that would have been sent to landfill sites each day was either composted or recycled. This amounts to a saving of 200 tonnes per year.

The Zero Waste Community

The ideal scenario is to create zero waste communities where rubbish is not seen as refuse but as a resource. Recycling alone will not do away with the need for landfills and incinerators, nor will it reverse the rapid depletion of natural resources. Clearly, the one-way system of extracting virgin resources to make packaging and products that will later be buried or burned is not sustainable.

Zero waste is a new way of looking at the waste stream. Instead of seeing used materials as garbage in need of disposal, refuse is seen as a valuable resource. Rubbish represents jobs, financial opportunity, and raw material for new products. The aim is to keep all materials within the production cycle.

Aiming for zero waste means designing products and packaging with reuse and recycling in mind. It means making manufacturers take responsibility for the entire lifecycle of their products and packaging.

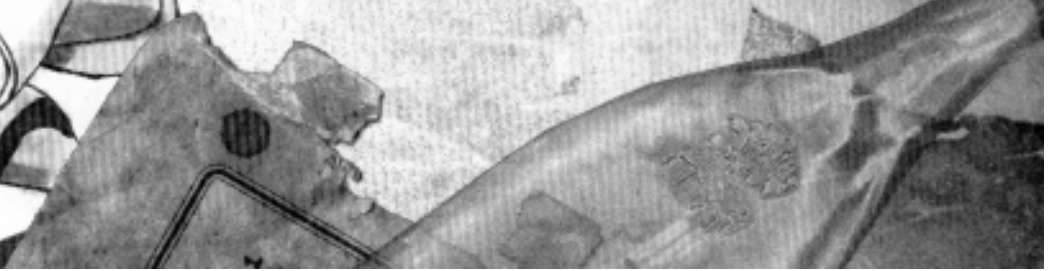
Zero waste efforts have the potential to change the face of solid waste management in the future. Instead of managing waste, the objective of the entire cycle of production and consumption will be to manage resources and eliminate waste.



RECYCLING

THE RIGHT STUFF

The biggest dents can be made in the seemingly unsurmountable issue of waste management by adopting the principle of the three "R"s — Reduce, Reuse and Recycle — and pushing for the two other "R"s — Refuse and Responsibility.



WITH THE WORLD'S GARBAGE, RUBBISH AND HAZARDOUS WASTE BURGEONING OUT OF CONTROL, A RADICAL NEW APPROACH NEEDS TO BE TAKEN FOR WASTE MANAGEMENT. RATHER THAN LOOKING AT IT AS SIMPLY A MATTER OF GETTING RID OF THE RUBBISH THAT WE PRODUCE, POLICY-MAKERS NEED TO VIEW IT IN THE CONTEXT OF THE COMPLETE LIFECYCLE OF A PRODUCT — FROM PRODUCTION AND CONSUMPTION TO COLLECTION AND DISPOSAL. SEEING IT FROM THIS PERSPECTIVE BRINGS THE PRINCIPLE OF 3 "R"'S — REDUCE, REUSE AND RECYCLE — INTO FOCUS.



REDUCE

WASTE REDUCTION IS KEY TO ANY SUCCESSFUL WASTE MANAGEMENT EFFORT. BY REDUCING THE AMOUNT OF WASTE PRODUCED IN THE FIRST PLACE, WE CAN CONSERVE RESOURCES AND REDUCE DISPOSAL COSTS AND POLLUTION. WE CAN START BY ANALYZING WHAT WE THROW AWAY AT HOME. THIS INCLUDES THINKING ABOUT THE GOODS AND SERVICES WE BUY AND IN WHAT WAYS THEY CONTRIBUTE TO THE GROWING WASTE MOUNTAIN. THE MANUFACTURING INDUSTRY CAN HELP REDUCE WASTE BY MINIMIZING THE PACKAGING USED IN PRODUCTS AND BY DESIGNING GOODS THAT LAST LONGER.

WHAT YOU CAN DO

THE CHOICES YOU MAKE CAN DRASTICALLY REDUCE WASTE GENERATION.



If you have a choice between two products, buy the one with the least packaging.



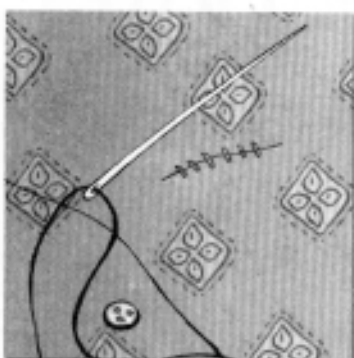
Buy household items like shampoo and washing powder in bulk.



Buy durable items that are easy to repair, have a good warranty, are energy-efficient and non-polluting.



Avoid buying disposable items like plastic plates and polystyrene cups, as they all end up in landfills.



Repair old clothes, appliances and furniture instead of throwing them away.



Use cloth or jute bags for shopping.

REUSE

THE CENTRAL IDEA TO REUSING PRODUCTS IS THAT THEY ARE SEEN AS RESOURCES RATHER THAN REFUSE. MANY PRODUCTS CAN BE REUSED IN THEIR ORIGINAL FORM OR THEY CAN BE PASSED ON TO FRIENDS AND FAMILY WHO CAN MAKE USE OF THEM INSTEAD OF SIMPLY BEING THROWN AWAY. REUSING PRODUCTS AND MATERIALS HELPS GENERATE LESS WASTE, WHICH AGAIN REDUCES THE COST OF MANAGING SOLID WASTE AND CONSERVES PRECIOUS NATURAL RESOURCES.

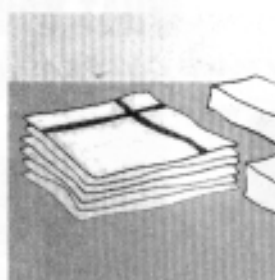
WHAT YOU CAN DO



Before discarding a product, consider whether it could be put to any another use.



Use washable cups instead of disposables.



Use cloth napkins, dusters and sponges that can be washed and reused.



Purchase items in refillable containers.



Reuse wrapping paper, plastic bags and boxes.



Buy returnable containers for drinks.



Use both sides of paper for writing and typing.

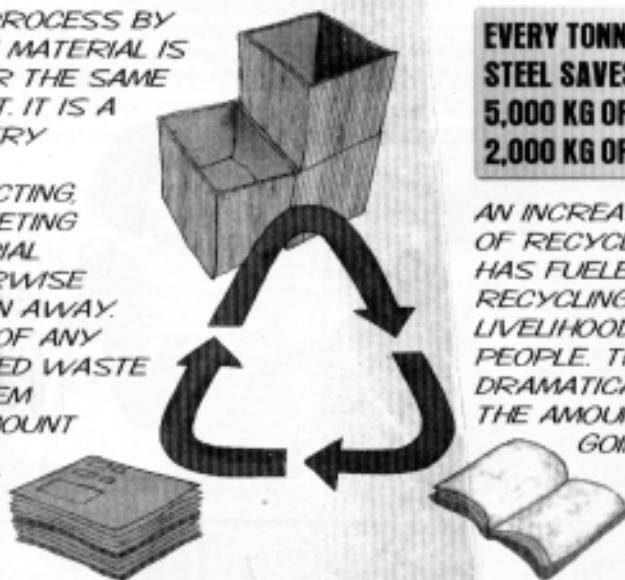
Reuse empty glasses, jars and containers for storing household items like buttons, nails and screws.



Organize your own swap shop.

RECYCLE

RECYCLING IS THE PROCESS BY WHICH A REUSABLE MATERIAL IS REMADE INTO EITHER THE SAME OR A NEW PRODUCT. IT IS A RESOURCE RECOVERY METHOD INVOLVING SEPARATING, COLLECTING, PROCESSING, MARKETING AND USING A MATERIAL THAT WOULD OTHERWISE HAVE BEEN THROWN AWAY. IT IS A VITAL PART OF ANY EFFICIENT INTEGRATED WASTE MANAGEMENT SYSTEM AS IT LIMITS THE AMOUNT OF WASTE BEING DUMPED AND HELPS EXTEND THE VALUE AND UTILITY OF AN ITEM.



EVERY TONNE OF RECYCLED STEEL SAVES MORE THAN 5,000 KG OF IRON ORE AND 2,000 KG OF COAL.

AN INCREASE IN THE SUPPLY OF RECYCLABLE MATERIALS HAS FUELED THE INFORMAL RECYCLING SECTOR, CREATING LIVELIHOODS FOR MILLIONS OF PEOPLE. THEIR EFFORTS HAVE DRAMATICALLY REDUCED THE AMOUNT OF WASTE GOING TO LANDFILLS.

WHAT YOU CAN DO



Always segregate household waste into compostable and recyclable items.



Collect glass, plastic, paper and metal cans and sell them to kabaadiwalas (people who collect waste materials for recycling).

Give household waste to garbage collectors rather than throwing it out on to the street.



Buy recycled products.

ANOTHER TWO "R"s

Refuse

Refuse what you don't need. Instead of buying new containers from the market, use the ones already in the house. Refuse plastic bags when you go shopping. Instead of accepting new ones, which invariably end up in landfills, take your own shopping bags with you.



Responsibility

Everyone in society has a responsibility for some aspect of waste management. State policy should encourage or make it mandatory for industry to minimize waste and make products that are recyclable. Industry should make sure products have built-in costs for waste management and recycling. Each person needs to behave responsibly within the overall framework of refuse, reduce, reuse and recycle.



EXTENDING RESPONSIBILITY

ONE IDEA WHOSE TIME HAS COME IS

EXTENDED PRODUCER RESPONSIBILITY (EPR).

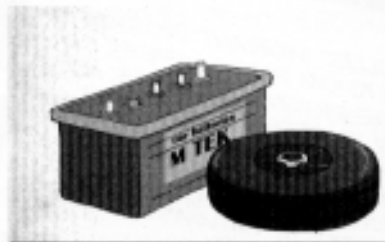
THE CENTRAL FEATURE OF EPR IS THAT PRODUCERS ARE OBLIGED TO TAKE BACK THEIR PRODUCTS FOR RECYCLING OR DISPOSAL. IT MEANS THAT A COMPANY MUST BE RESPONSIBLE NOT ONLY FOR MAKING THE PRODUCT, BUT ALSO FOR WHAT HAPPENS TO IT AT THE END OF ITS USEFUL LIFE. THE IDEA IS THAT BY MAKING PRODUCERS PAY FOR THE WASTE AND POLLUTION THEY CREATE, THEY WILL BE ENCOURAGED TO THINK ABOUT THE ENVIRONMENTAL IMPACT OF THEIR PRODUCTS IN TERMS OF THEIR DESIGN AND THE MATERIALS USED. THE CONCEPT OF EPR WAS DEVELOPED IN SWEDEN BUT WAS FIRST IMPLEMENTED IN 1991 IN GERMANY. SINCE THEN THE IDEA HAS SPREAD AND HAS BEEN ADOPTED BY MUCH OF THE INDUSTRIALIZED WORLD.

HERE ARE FOUR WAYS TO SHIFT RESPONSIBILITY FOR WASTE FROM GOVERNMENT AND TAXPAYERS TO PRODUCERS AND CONSUMERS.



DEPOSIT REFUND SYSTEMS

Under these systems, consumers are given money back when they return a product or its packaging. In several European countries, consumers receive cash back when they return drinks bottles.



ADVANCED DISPOSAL FEES

Consumers are charged with the costs of disposing of a product at the point of sale. The more difficult it is to dispose of or recycle a product, the more expensive it will be. This fee is aimed at influencing the choice of materials used in the manufacture of products.



PRODUCT CHARGES

A product will cost more depending on the materials used. The more environmentally harmful the product, the more expensive it will be. An eco-tax levied in Belgium successfully cut consumption of PVC in that country.



VOLUNTARY AGREEMENTS TIED TO MANDATORY REGULATIONS

These agreements are aimed at phasing out undesirable materials and encouraging the use of recyclables. A voluntary deposit scheme for aluminium cans in Sweden helped the industry achieve government recycling targets.

AT THE MOMENT THERE IS NO COMPREHENSIVE GOVERNMENT POLICY ON EPR IN INDIA. DEPOSIT REFUND SYSTEMS HAVE EXISTED IN INDIA FOR YEARS, PARTICULARLY FOR GLASS BOTTLES, BUT THESE WERE INTRODUCED MORE FOR ECONOMIC REASONS THAN ENVIRONMENTAL ONES. EFFORTS ARE BEING MADE TO MAKE THE TAKE-BACK OF PET BOTTLES MANDATORY, BUT DISCUSSIONS WITH INDUSTRY OFFICIALS HAVE MOVED FROM A MANDATORY SCHEME TO A VOLUNTARY ONE. INDUSTRY'S TRACK RECORD IN INDIA HAS SHOWN THAT "VOLUNTARY" COMPLIANCE IS USUALLY NO COMPLIANCE.



ECOMARK

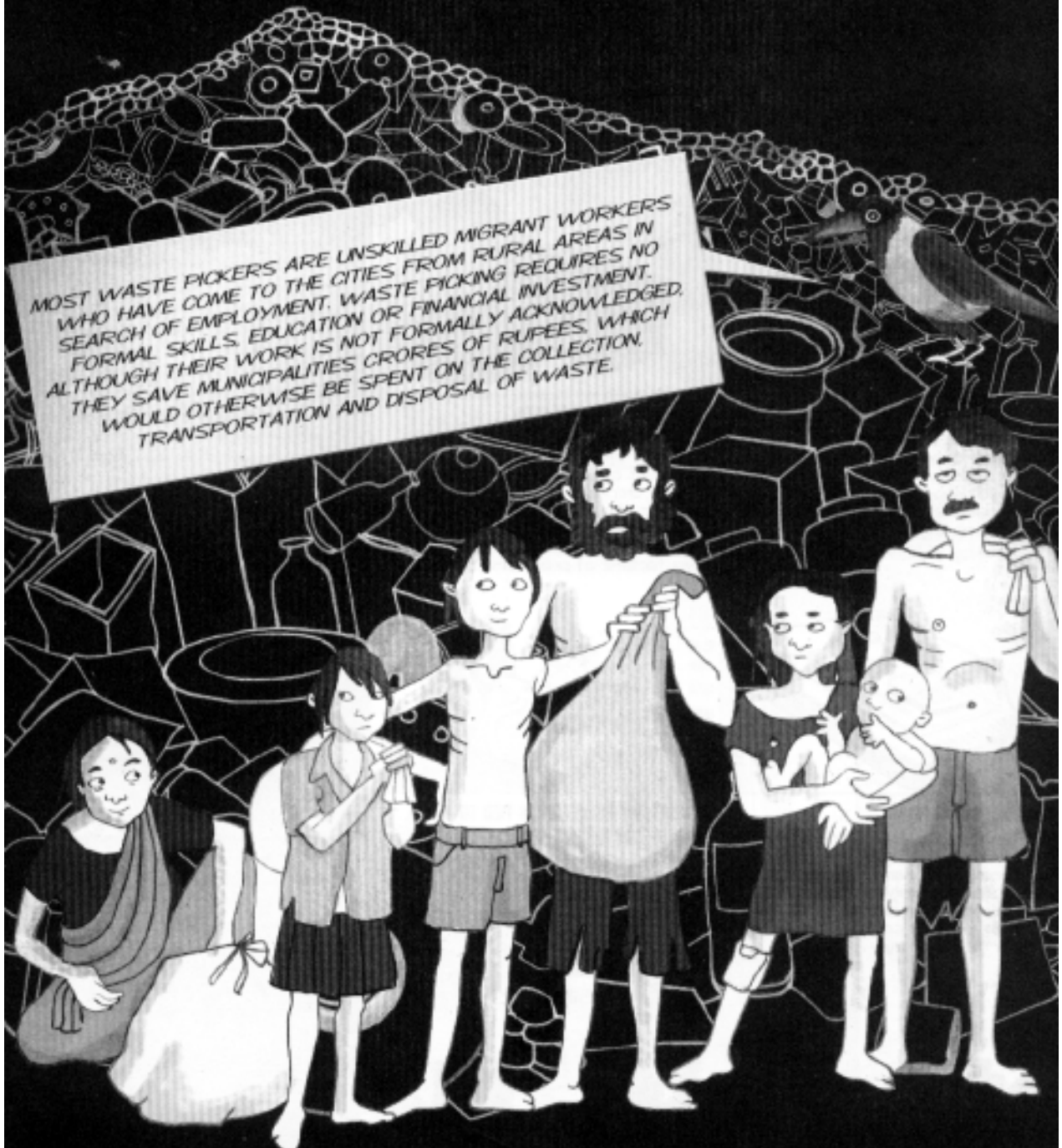
IN 1991, THE INDIAN GOVERNMENT LAUNCHED THE ECOMARK SCHEME FOR THE LABELING OF ECO-FRIENDLY PRODUCTS. SUBSEQUENT STUDIES HAVE SHOWN THAT NOT A SINGLE PRODUCT IN THE MARKET BEARS THE ECOMARK, LARGELY DUE TO A LACK OF INCENTIVES FOR INDUSTRY.



WASTE WARRIORS

THE RECYCLING INDUSTRY RELIES HEAVILY ON AN UNRECOGNIZED ARMY OF WASTE PICKERS. THESE WASTE PICKERS RETRIEVE RUBBISH FROM THE STREETS, DUSTBINS AND DUMPS, SORT THROUGH IT AND SELL IT ON TO WASTE DEALERS. IT IS ESTIMATED THAT THEY PICK UP 10-15 PERCENT OF THE TOTAL WASTE PRODUCED IN URBAN AREAS, AND PASS IT ON TO THE RECYCLING INDUSTRY. MATERIALS SELECTED FOR RECYCLING INCLUDE PAPER, PLASTIC, METAL, GLASS AND RAGS.

MOST WASTE PICKERS ARE UNSKILLED MIGRANT WORKERS WHO HAVE COME TO THE CITIES FROM RURAL AREAS IN SEARCH OF EMPLOYMENT. WASTE PICKING REQUIRES NO FORMAL SKILLS, EDUCATION OR FINANCIAL INVESTMENT. ALTHOUGH THEIR WORK IS NOT FORMALLY ACKNOWLEDGED, THEY SAVE MUNICIPALITIES CRORES OF RUPEES, WHICH WOULD OTHERWISE BE SPENT ON THE COLLECTION, TRANSPORTATION AND DISPOSAL OF WASTE.



WASTE PICKERS PLAY A VITAL ROLE IN THE SEGREGATION OF WASTE. THEY SEPARATE WHATEVER THEY COLLECT ACCORDING TO THE TYPE OF MATERIAL AND SELL THEIR RECOVERED RECYCLABLES TO WASTE DEALERS, WHO IN TURN SELL THEM ON TO RECYCLING UNITS. IT IS HERE THAT WASTE MATERIALS ARE PROCESSED AND NEW ITEMS ARE PRODUCED FOR SALE.

WHILE WASTE PICKERS PROVIDE RESIDENTS WITH A CLEANER CITY AND BETTER ENVIRONMENT, THEY THEMSELVES LIVE IN SUB-HUMAN CONDITIONS OF FILTH, DEPRIVATION AND SOCIAL OSTRACISM.

A SURVEY CONDUCTED BY THE NGO SRISHTI IN DELHI IN 2001 FOUND THAT 97 PERCENT OF THE CITY'S 100,000 WASTE PICKERS LIVE IN SLUMS.

IN SOME CITIES, A SUBSTANTIAL NUMBER OF THE WASTE PICKERS ARE WOMEN. IN MUMBAI, A SURVEY REVEALED 80 PERCENT OF WASTE PICKERS WERE WOMEN.

CHILDREN ALSO MAKE UP A SIGNIFICANT PORTION OF THE WORKFORCE. IN DELHI, A SURVEY FOUND THAT 24 PERCENT OF THE CITY'S WASTE PICKERS WERE CHILDREN BELOW THE AGE OF 16. SOME OF THEM HAD STARTED WORK AT THE AGE OF 6.



THE INCOME OF WASTE PICKERS DEPENDS ON HOW THEY COLLECT WASTE AND WHERE THEY DO THEIR JOB. IN DELHI, WASTE PICKERS WHO COLLECT WASTE IN A SACK EARN BETWEEN RS 45 AND RS 80. THOSE WHO OWN A TRICYCLE CAN EARN UP TO RS 200 A DAY.

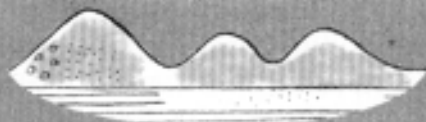
RECYCLING CAN BE SUSTAINABLE ONLY WHEN THERE IS A MARKET FOR THE RECYCLED PRODUCTS. PEOPLE NEED TO BE WILLING TO BUY RECYCLED PRODUCTS FOR IT TO MAKE ECONOMIC SENSE.

YOU DO THE MATH



= 1 JOB

*THE WORK OF
INCINERATING 10,000 TONNES OF WASTE RESULTS
IN THE CREATION OF ONE JOB.*



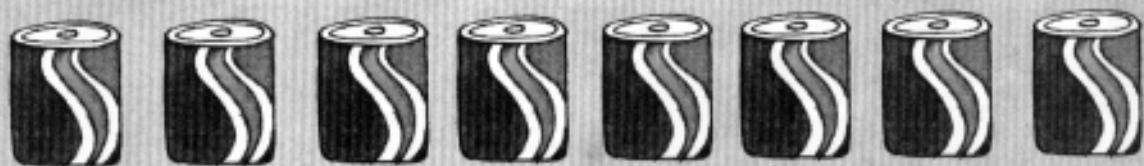
= 6 JOBS

*GETTING THE SAME AMOUNT
LANDFILLED CREATES SIX JOBS.*



= 36 JOBS

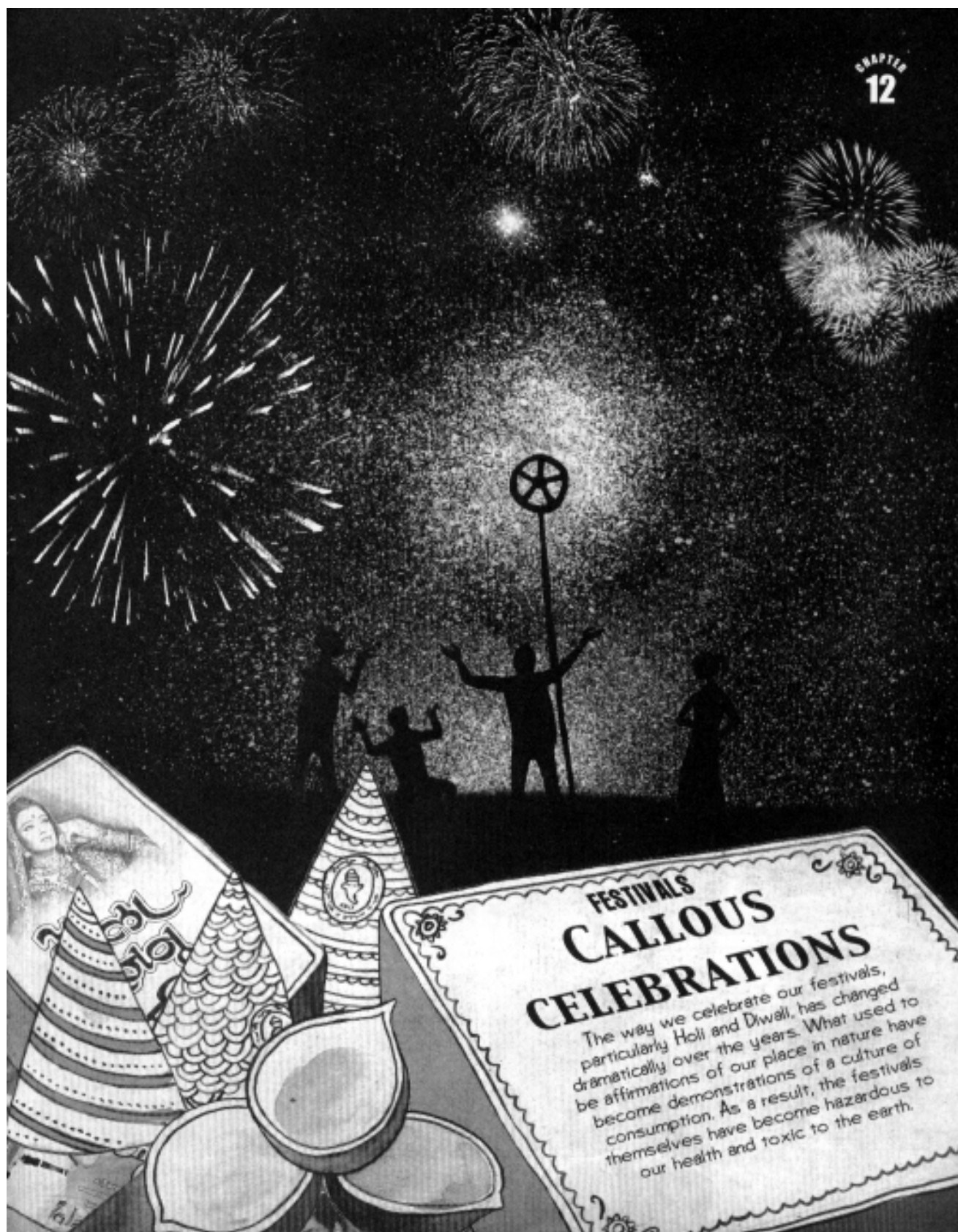
*WHILE THE VARIOUS TASKS INVOLVED
IN RECYCLING THAT AMOUNT CAN LEAD
TO THE CREATION OF 36 JOBS.*

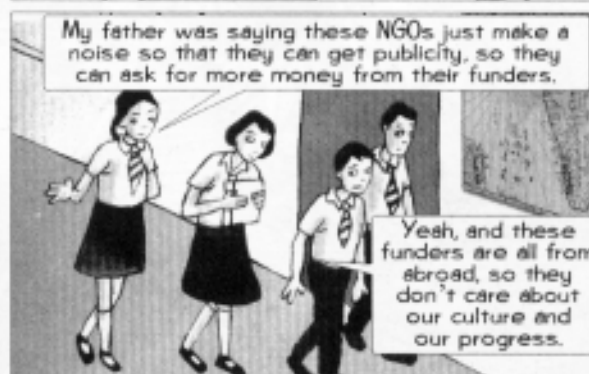
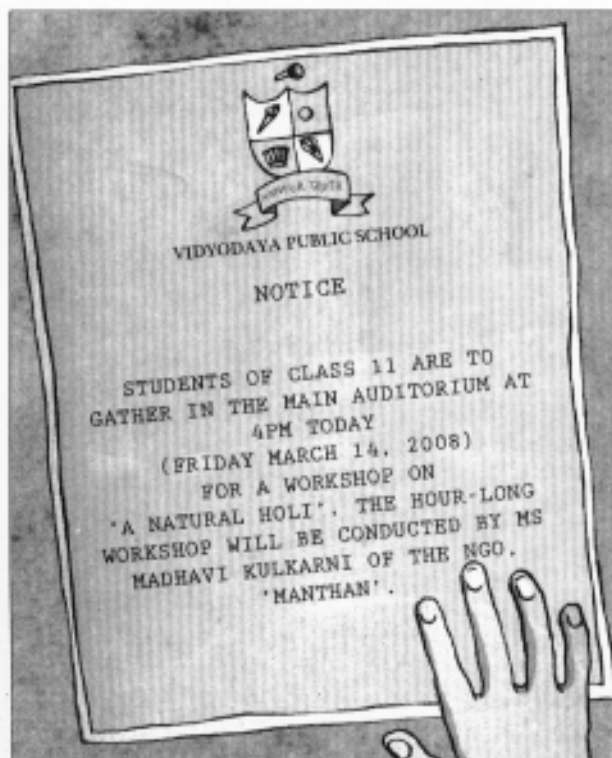


*IT TAKES THE SAME AMOUNT OF ENERGY TO PRODUCE 20 CANS OUT OF RECYCLED MATERIAL
AS IT DOES TO MAKE JUST ONE FROM SCRATCH.*

RECYCLING PROVIDES EMPLOYMENT FOR AROUND 100,000 WASTE PICKERS IN DELHI.

*TIN TAKES 100 YEARS, ALUMINIUM 500 YEARS AND GLASS A MILLION YEARS TO BREAK DOWN
UNDER NATURAL CONDITIONS.*







That's completely foolish.
Maybe some NGOs...



Are you saying my father
is a fool?



No, no, that wasn't what I was saying.
I was only saying that some NGOs
may be like that, but I know Madhevi
did personally. She isn't like that —
her work is from the heart.



How do you know?

I've even worked with her in
my holidays. She runs
campaigns which help to solve
the problems that we are
always complaining about. You
should keep an open mind.



Anemike's mind is wide open.
That's why so much dirt gets
into it.



Four o'clock, in the
main auditorium.

A WARM WELCOME
TO Good afternoon,
boys and girls.
Please be seated.



I would like to
welcome Ms. Madhevi
Kulkarni, field worker
for the NGO Manthan,
who has kindly
agreed to conduct a
workshop for us on
"A Natural Holi." She
will now say a
few words.



Thank you, Miss Neelam, for this opportunity, and thanks to Anamika, Ruchi and Anupam for the wonderful arrangements.



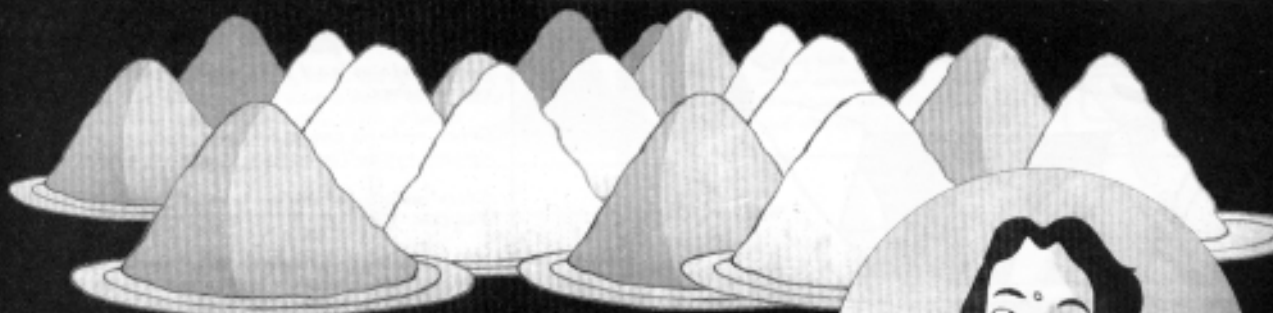
Holi, the Festival of Colors, has been celebrated for centuries in India. But the way it is celebrated has changed dramatically in the last 50 years, and the modern aspects are causing great damage to the environment and to our health.





Bonfires, which are lit on the first day of the celebrations to signify the burning of Holika, use up forests of wood, while spraying one another with hose pipes and throwing water balloons wastes huge volumes of water.

But perhaps worst of all are the colors themselves, many of which are now composed of damaging toxic chemicals.



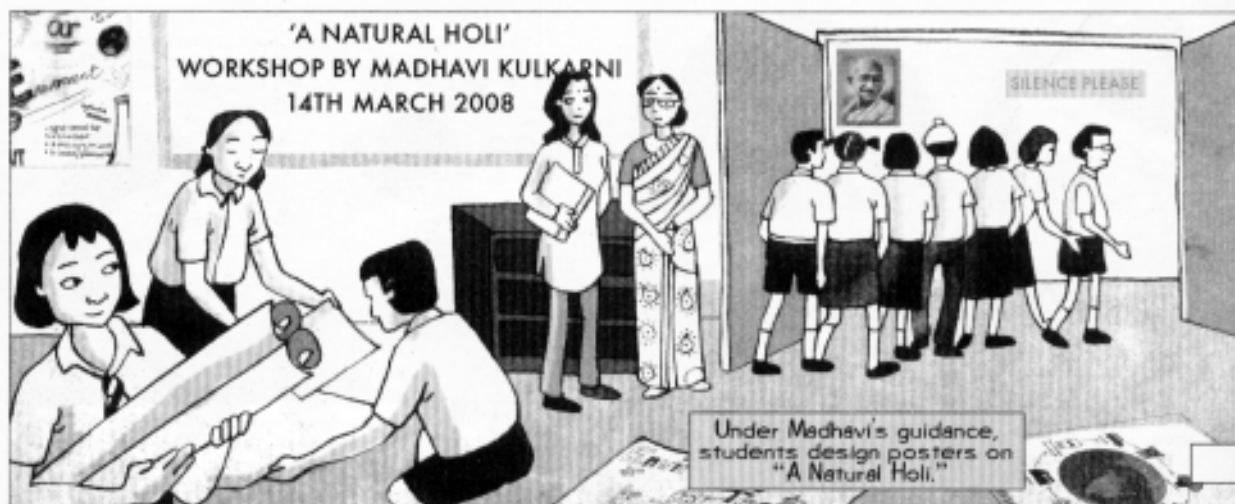
Traditionally, the colors that were used to celebrate Holi came from the flowers of trees that blossomed during spring.

Not only were the colors bright and beautiful, but most of these trees also had medicinal properties and were beneficial to the skin.



Over the years, as trees disappeared from urban areas, these natural colors were replaced by easy-to-purchase industrial dyes.

These man-made dyes, manufactured through chemical processes, contain heavy metals, asbestos and other harmful substances, which are highly regulated or even banned in some countries.



HOLI*

Pastes

Black contains lead oxide and can cause renal failure.

Green contains copper sulphate and can cause eye allergy, puffiness and temporary blindness.

Silver contains aluminium bromide, which is carcinogenic.

Blue contains prussian blue which can lead to contact dermatitis.

Red contains mercury sulphate, which is highly toxic and can cause skin cancer.

Studies carried out in the state of Gujarat have revealed that each Holika bonfire uses around 100 kg of wood, and that around 50,000 bonfires are lit in that state alone. This amounts to 50,000 tonnes of wood which goes up in smoke in Gujarat each year.

Holi smoke!

Light one symbolic communal fire rather than several smaller ones and reduce consumption of wood.

Use waste material rather than wood to feed the fire.



NATURALLY

Powders

Commonly known as gulals, have two components, a colourant that is toxic and a base that could be either asbestos or silica, both of which cause serious health problems.



Liquids

Mostly use gentian violet as a colour concentrate, which can cause skin discolouration and dermatitis.



The chemicals are washed away and eventually find their way into the water people use for washing, drinking and irrigating crops. The dyes end up in the food chain and as they are extremely persistent can remain there for several years.



How to pull off a homemade Holi

Mix haldi powder with besan for a lovely yellow.

Slice a beetroot and soak in water for a deep pink.

Boil Marigold or Teas flowers in water for a yellow colour. The other easy way to get a yellow liquid colour is to soak peels of pomegranate (Anar) overnight.

For an orange-red paste, karna leaves (mehandi) can be dried, powdered and mixed with water.

Dry and finely powder the leaves of Gulmohar (Delonix regia) tree for a green.

Dry red hibiscus flowers in shade and powder to make a lovely red colour. To increase the bulk, add any flour to it.





Some of the posters are nice. But do you think these events really make any difference?



Yes, I do, Anamika. I have seen the effects of the campaigns we run. There's no one better to speak to than children. Adults don't have the time, and they are not keen to listen.

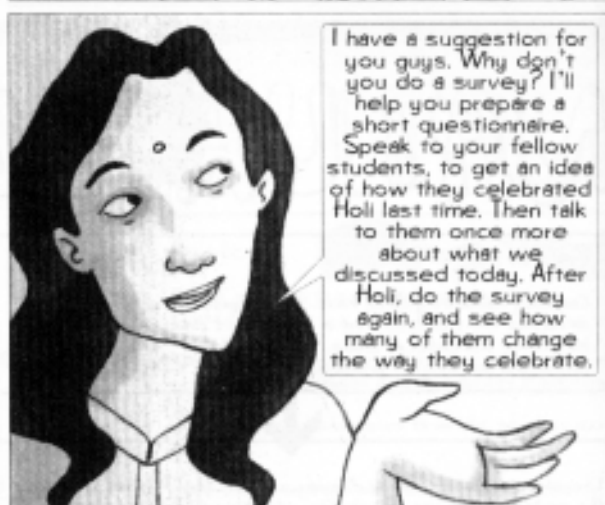
14TH MARCH 2

But the same thing happens with us. Very few students want to listen when we say something serious.



Change is always slow and difficult. But you have to be patient.

How do we know any change is taking place at all?



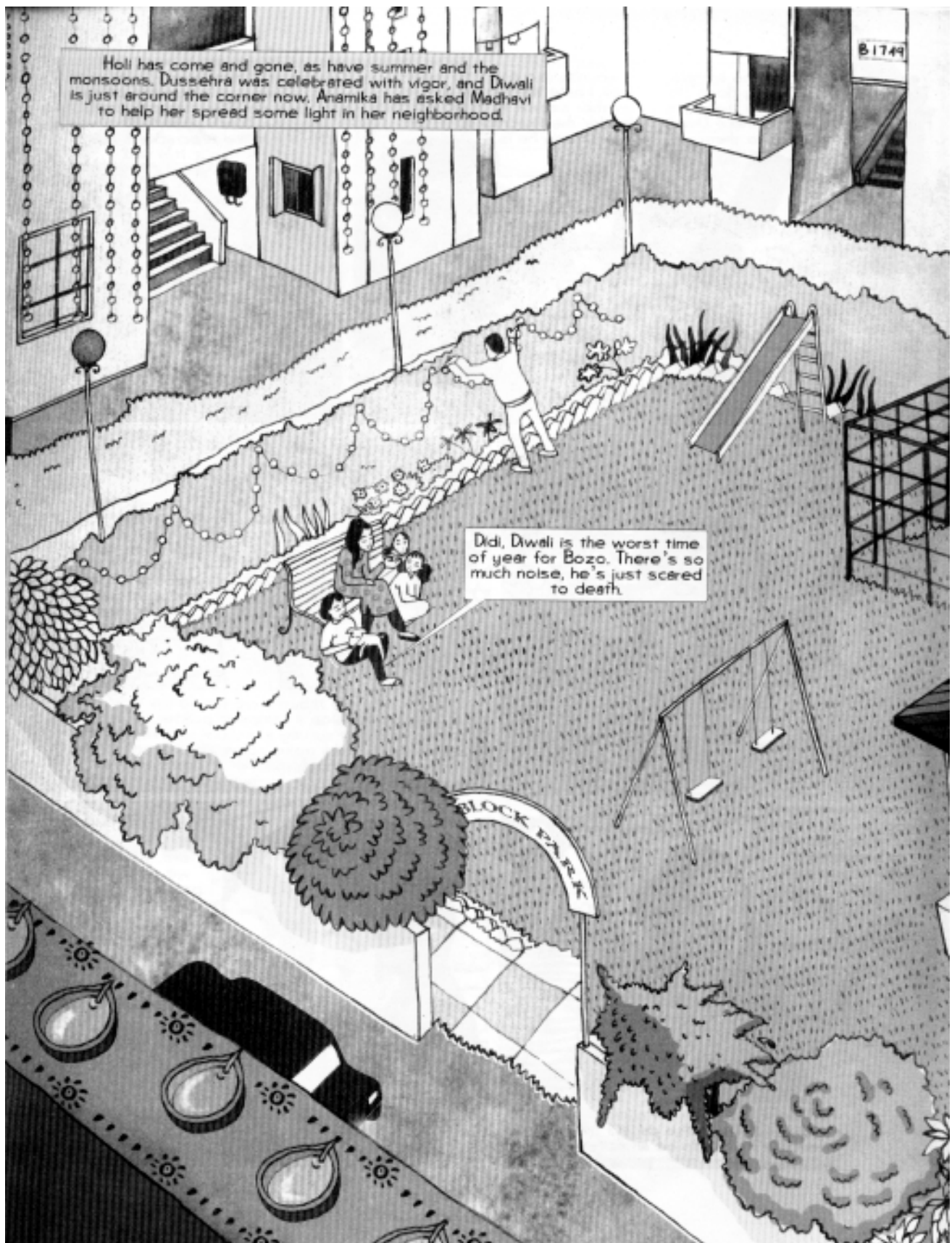
I have a suggestion for you guys. Why don't you do a survey? I'll help you prepare a short questionnaire. Speak to your fellow students, to get an idea of how they celebrated Holi last time. Then talk to them once more about what we discussed today. After Holi, do the survey again, and see how many of them change the way they celebrate.



Okay, we'll do that. At least we'll get an idea if doing these things makes any difference.

Holi has come and gone, as have summer and the monsoons. Dussehra was celebrated with vigor, and Diwali is just around the corner now. Anamika has asked Madhavi to help her spread some light in her neighborhood.

Didi, Diwali is the worst time of year for Bozo. There's so much noise, he's just scared to death.



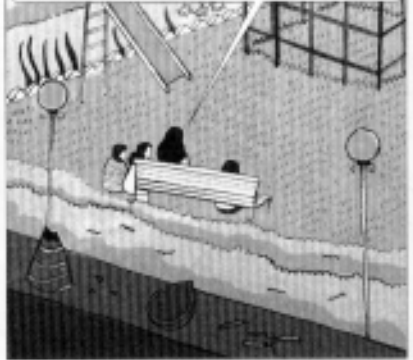
Yeah, I really feel for the animals. Their hearing, especially dogs', is so much more sensitive than ours. Firecrackers probably make Diwali sound like a war to them.



It sounds like a war to me as well. I hate the racket, but my brother seems to think that the louder the firecracker is, the more manly he is.



Look at all the things Diwali used to be about — lamps and candles, sweets, new clothes, family reunions, freshly-painted houses. Now it's like firecrackers are all it's about. It's sad.



It creates so much smog, my insides burn when I breathe. Not just on Diwali, but for days afterwards.



It's certainly become the most polluting event we have regularly. The noise pollution, the air pollution, the amount of paper and burnt garbage on the streets the day after.



That's why we thought we would ask you to help us develop a campaign poster for our colony. The Holi survey in school showed us that speaking up does make some difference, so we thought we should do that at home as well.

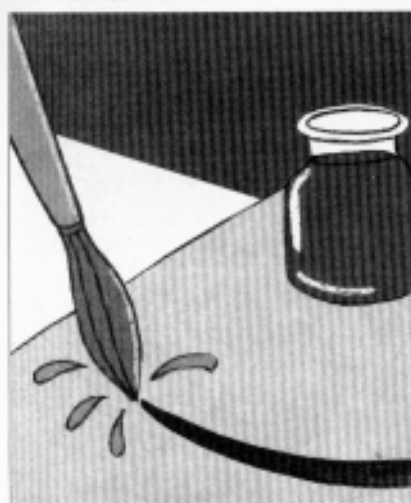
Good for you. I think you're on your way to becoming an activist yourself.



You know, Didi, with the number of problems in life these days, I think everyone needs to be an activist.

Okay, let's get to it. What do we want the poster to say?







LIGHT UP YOUR LIFE, DON'T BURN IT AWAY!

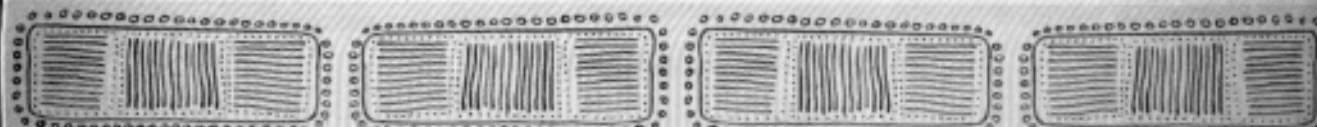


The burning of crackers during Diwali releases huge quantities of toxic fumes and gases into the air, such as carbon dioxide, sulphur dioxide and nitrogen dioxide, turning built-up towns and cities into vast gas chambers. Levels of suspended particulate matter (SPM) also increase dramatically on this day, triggering breathing problems in vulnerable people like children and pregnant women, and those already suffering from respiratory diseases. Doctors report a rise in the number of eye, throat and nose problems, as well as acute bouts of asthma, bronchitis and heart attacks after Diwali.

In 2000, the High Court in Delhi banned the loudest crackers, limiting the sound to 125 dB – the equivalent of a burst car tyre. It is also now mandatory for manufacturers to mark their products with the level of pollution caused by them.



Let Diwali be a Festival of Lights, not Sound
Light Candles and Lamps, not Crackers





The fire in the crackers

Analysis of the chemical composition of firecrackers has shown that highly toxic substances are present in significant quantities, which are released into the environment when the crackers are burst. These include:

- **Copper:** Can be poisonous if ingested by humans. Inhalation of copper dust and fumes causes irritation of the respiratory tract.
- **Cadmium:** Inhalation or ingestion of cadmium can damage the kidneys and cause anaemia. It is a potential carcinogen.
- **Lead:** Can affect the central nervous system and cause cancer of the lungs and kidneys if inhaled. Young children can suffer mental retardation and brain damage if exposed to lead.
- **Magnesium:** Inhalation of magnesium dust and fumes can cause metal fume fever. If particles become embedded in the skin, they can produce gangrene and blisters.
- **Manganese:** Exposure to manganese can cause sleepiness, weakness, emotional disturbance and, in extreme cases, paralysis.
- **Sodium:** Sodium is a highly reactive element. When it comes into contact with moisture, it produces very caustic sodium hydroxide, which can damage living tissue. When heated in air, it emits toxic fumes such as sodium oxide.
- **Zinc:** Perhaps the least toxic of all heavy metals, zinc can still affect the pulmonary system. It becomes toxic when absorbed in excess.

Children at risk

Around 100,000 children work in fireworks factories where labor laws and the Explosives and Factory Act are often ignored. The children are employed because cracker-making is delicate work, which requires small, nimble hands. Some of the children start work when they are as young as three years old. They work up to 18 hours a day in unhygienic, dingy and suffocating factories, for as little as Rs 15 per day. They handle dangerous chemicals like sulphur, potash, phosphorus, nitrates and chlorates that cause deadly disease of the lungs, kidneys, skin and eyes.

In 1995, eight children died in a fire at a cracker factory in Rohtak, Haryana.

- **Nitrate:** The ingestion of large amounts can have serious and even fatal effects. Symptoms include dizziness, abdominal cramps, vomiting, bloody diarrhea, weakness, convulsions and collapse.
- **Nitrite:** Large amounts may cause nausea, vomiting, collapse and even coma.
- **Phosphorus in PO_4 :** Ingestion affects the central nervous system. If ingested in large quantities, it can have an acute effect on the liver and cause severe eye damage.
- **Sulphur in SO_2 :** It is an eye and skin irritant and is corrosive. It affects the upper respiratory tract and can induce respiratory paralysis.



Glossary

- **BMW:** Bio-medical Waste
- **CNG:** Compressed Natural Gas
- **EPA:** Environmental Protection Act 1980
- **E-waste:** Electronic waste
- **LEED:** Leadership in Energy and Environmental Design
- **LPG:** Liquid Petroleum Gas
- **MOEF:** Ministry of Environmental and Forests
- **MSW:** Municipal Solid Waste
- **POPs:** Persistent Organic Pollutants
- **PP:** Polypropylene
- **PVC:** Polyvinyl Chloride
- **ROHS:** Restriction of Hazardous Substances Directive
- **UNEP:** United Nations Environment Programme
- **WEEE:** Waste Electrical and Electronic Equipment Directive
- **Acid rain:** Acid rain is rain or any other form of precipitation that is unusually acidic, that is, it has elevated levels of hydrogen ions (low pH). It has harmful effects on plants, aquatic animals and infrastructure. Acid rain is mostly caused by emissions of compounds of sulfur, nitrogen and carbon, which react with the water molecules in the atmosphere to produce acids. However, it can also be caused naturally by the splitting of nitrogen compounds by the energy produced by lightning strikes, or the release of sulfur dioxide into the atmosphere by phenomena of volcano eruptions.
- **Effluent:** Effluent in the man-made sense is generally considered to be water pollution, such as the outflow from a sewage treatment facility or the wastewater discharge from industrial facilities.

- **Emphysema:** Emphysema is a long-term, progressive disease of the lung that primarily causes shortness of breath. In people with emphysema, the lung tissues necessary to support the physical shape and function of the lung are destroyed. It is included in a group of diseases called chronic obstructive pulmonary disease or COPD (pulmonary refers to the lungs). Emphysema is called an obstructive lung disease because the destruction of lung tissue around smaller airways, called bronchioles, makes these airways unable to hold their shape properly when you exhale.
- **Erosion and sedimentation control technique:** Typically, when the earth's surface is exposed to the impacts of rainfall, there is an increase in the volume and velocity of run-off. This sets off a chain reaction that results in the transportation and deposition of sediment, reduced stream capacity, and ultimately increased stream scour and flooding. Additionally, suspended sediment contributes to a decline in water quality by blocking sunlight, reducing photosynthesis, decreasing plant growth, destroying bottom-dwelling species' habitat, carrying attached pollutants such as phosphorus, and so on. The list of negative impacts is long.
- **Energy Intensive Material (EIM):** EIMs are defined as commodities whose direct and indirect productive processes require unusually large amounts of energy. Production of non-fuel EIMs may have consumed, in the 1970s, 25–30 percent of the world's energy. Energy embodied in internationally-traded EIMs may be equivalent to one-third or more of the total direct international trade in energy.
- **Hazardous substances:** Hazardous materials in various forms can cause death, serious injury, long-lasting health effects, and damage to buildings, homes and other property. Many products containing hazardous chemicals are used and stored in homes routinely. These products are also shipped daily on the nation's highways, railroads, waterways and pipelines.
- **Heavy metals:** A heavy metal is a member of an ill-defined subset of elements that exhibit metallic properties, which would mainly include the transition metals, some metalloids, lanthanoids, and actinides. Heavy metal can include elements lighter than carbon and can exclude some of the heaviest metals. Heavy metals occur naturally in the ecosystem with large variations in concentration. In modern times, anthropogenic sources of heavy metals, such as pollution, have been introduced to the ecosystem. Waste-derived fuels are especially prone to contain heavy metals so they should be a central concern in a consideration of their use.
- **HVAC equipment:** Heating, Ventilating and Air Conditioning — the technology of indoor environmental comfort.
- **Landfill:** A landfill, also known as a dump, is a site for the disposal of waste materials by burial and is the oldest form of waste treatment.

- **Leachate:** Leachate is the liquid that drains or 'leaches' from a landfill; it varies widely in composition based on the age of the landfill and the type of waste that it contains. It can usually contain both dissolved and suspended material.
- **PFA limit:** The Prevention Food Adulteration (PFA) Act, 1954, provides tolerance limits for heavy metals in food articles. It has, however, several limitations — it does not provide tolerance limits of many food articles; and, of the 19 heavy metals, it has set limits only for seven.
- **Pulmonary oedema:** Pulmonary edema (American English), or oedema (British English) is fluid accumulation in the lungs. It leads to impaired gas exchange and may cause respiratory failure.
- **Rainwater harvesting:** Rainwater harvesting is the gathering, or accumulating and storing, of rainwater. Rainwater harvesting has been used to provide drinking water, water for livestock, water for irrigation or to refill aquifers in a process called ground-water recharge.
- **Renewable materials:** Renewable materials are substances derived from a living tree, plant, animal or ecosystem which has the ability to regenerate itself. A renewable material can be produced again and again. For example, when we use plantation wood to make paper, we can plant more trees to replace it.
- **Volatile Organic Compounds:** Volatile organic compounds (VOCs) are organic chemical compounds that have high enough vapor pressures under normal conditions to significantly vaporize and enter the atmosphere.
- **Water run-off:** This is the water flow which occurs when soil is infiltrated to full capacity, and excess water from rain, snowmelt or other sources flows over the land.

Behind the book

The entire content for this book was put together from information gathered by Delhi-based environmental rights group **Toxics Link**. The organization's researchers and activists have, over the course of the last 13 years, brought many of the issues discussed in this book to the forefront. Their work has largely been aimed in the past at those who make policy, as well as those who work on the ground in these sectors. This book, the text for which was compiled by members of the NGO, is an attempt to relay their findings to a larger audience.



The book was conceived, structured and scripted by **Aniruddha Sen Gupta**, who has worked with Toxics Link in defining communications strategy and designing communications products for several years. He has essayed a similar role with several other organizations and individuals in the social sector, in areas such as disability and human rights. An author of a children's book, he also works on educational multimedia projects. He currently splits his time between writing and devising quizzes and games. That is, when he's not playing with his dogs.

Priya Kuriyan is an independent animation film-maker and illustrator based in Delhi. A graduate of the National Institute of Design, Ahmedabad, she has directed educational films for the Sesame Street television show in India and has also co-directed a short animation film for the Children's Film Society of India. Over the past four years, she has also been illustrating for a number of children's books.

Project by Toxics Link
Script by Aniruddha Sen Gupta
Illustrations by Priya Kuriyan

The Sachdeva family is like many others. A father with a government job; his wife a homemaker; a son starting a career; and a daughter in high school. And like most other families in a big city, the Sachdevas are surrounded in their everyday lives by a cocktail of toxic substances they are hardly aware of.

Following these four — and some others who come in and out of their circle of existence — 'Our Toxic World' takes a close look at these hidden perils, and at what we can do to make our own lives, and the world around us, a little cleaner, a little safer.



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